THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CXII. No. 2477.] LONDON, NOVEMBER 1, 1910. [62ND YEAR. PRICE 6d.

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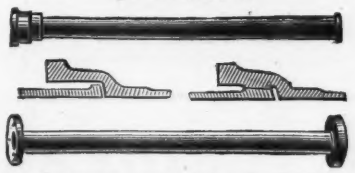

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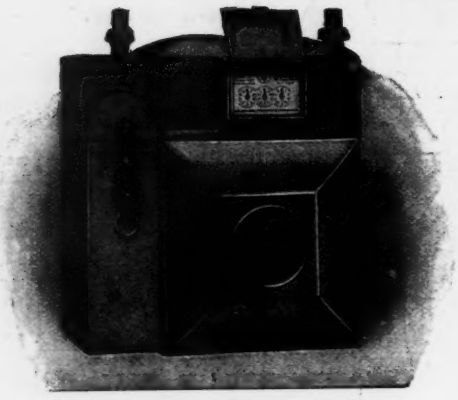

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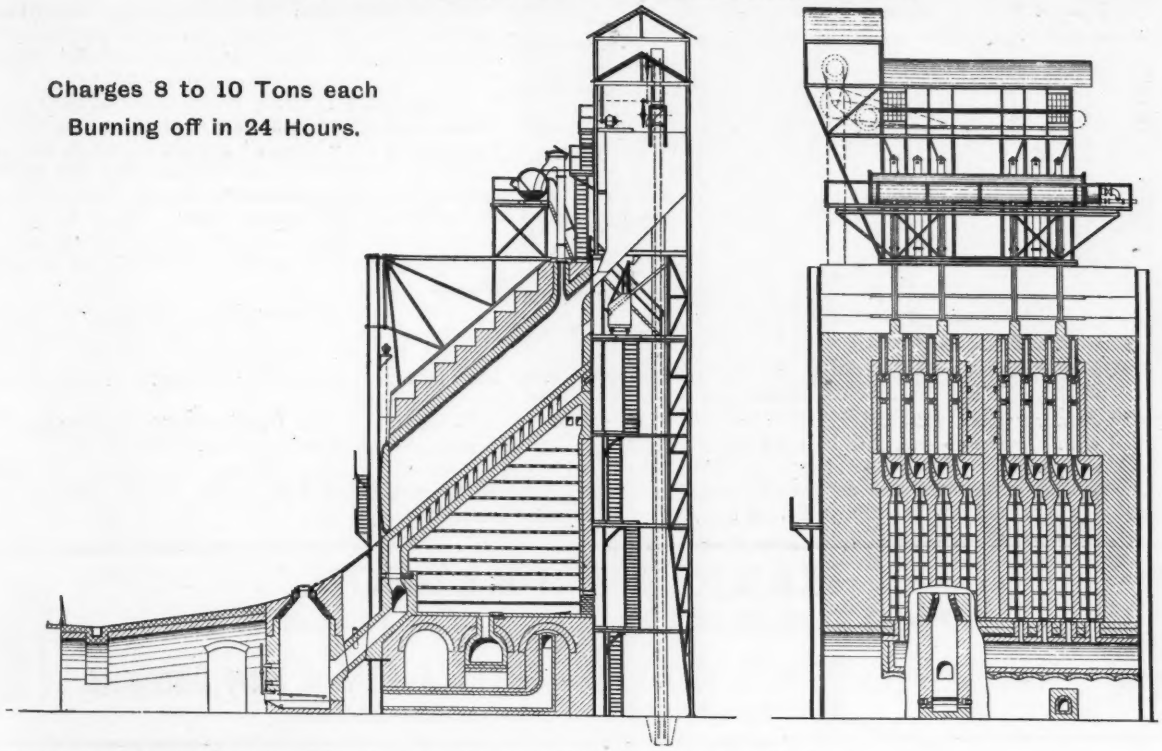

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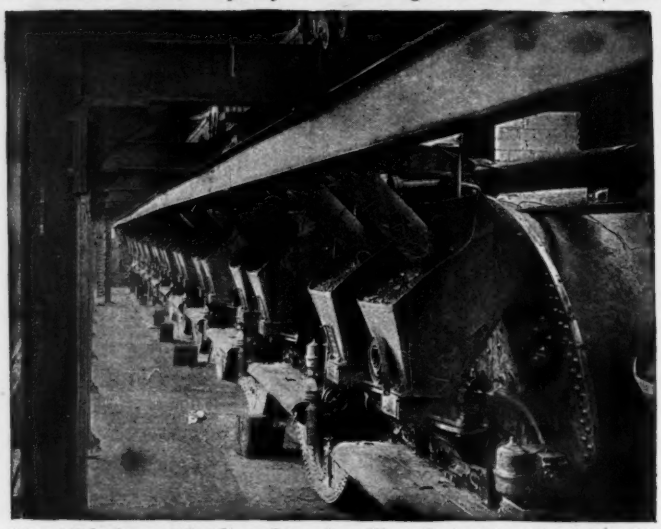
The arguments that have appeared under these head-lines in this Journal will doubtless be familiar to most of its readers. The majority of Gas Engineers will have agreed with them, and—must it be confessed?—"still go on from day to day just as they always went." The wise minority have translated the arguments practically and thereby transmuted smoke into gold, and converted poor and unsatisfactory dividends into something better.



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It is decidedly to the neglect of such details as those set forth by the above head-lines, and in the arguments that have followed them from time to time, that the Gas Companies of this year 1910 find themselves hard pressed by their more enterprising competitors in the electric field. "Reduce your cost of production" is still good advice, "and yet again reduce them" is better.

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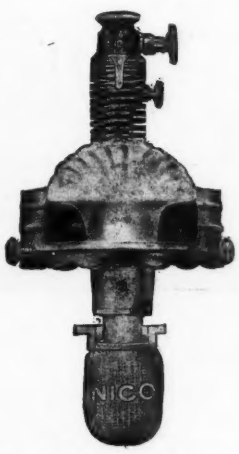

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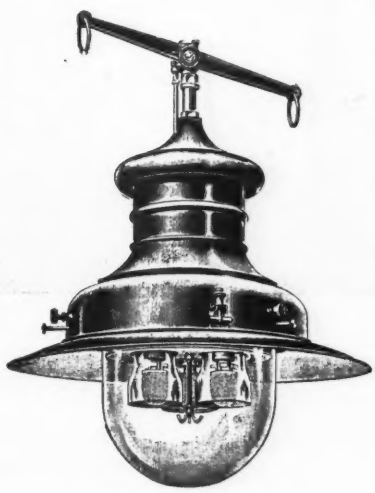

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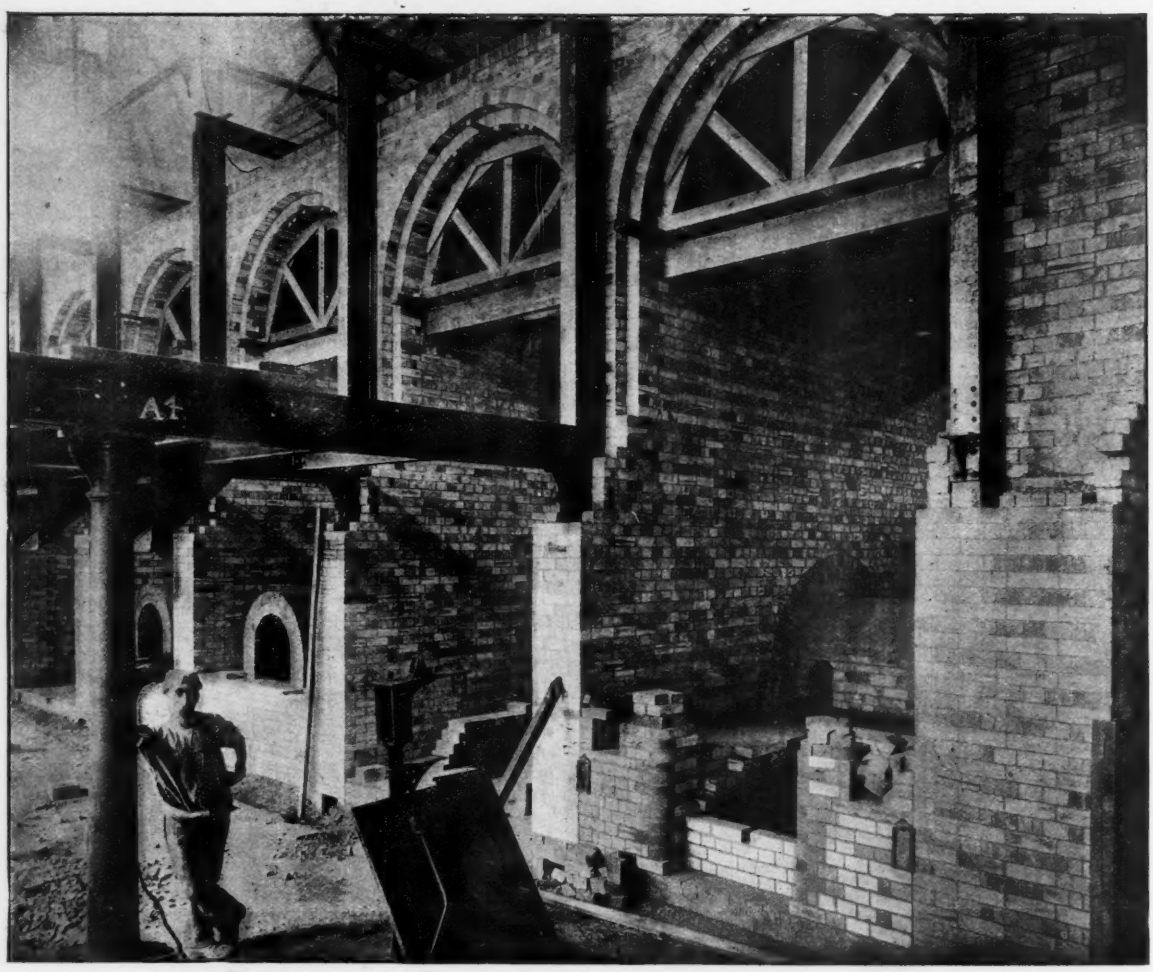

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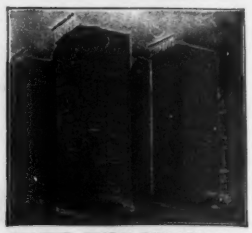

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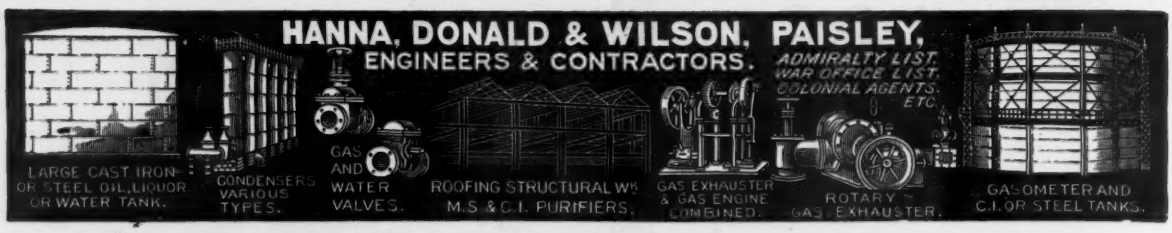
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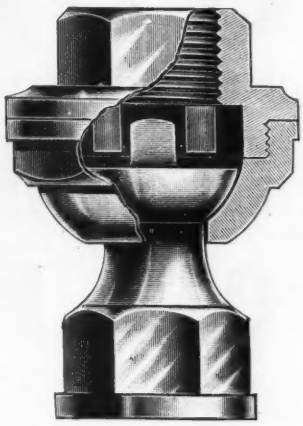

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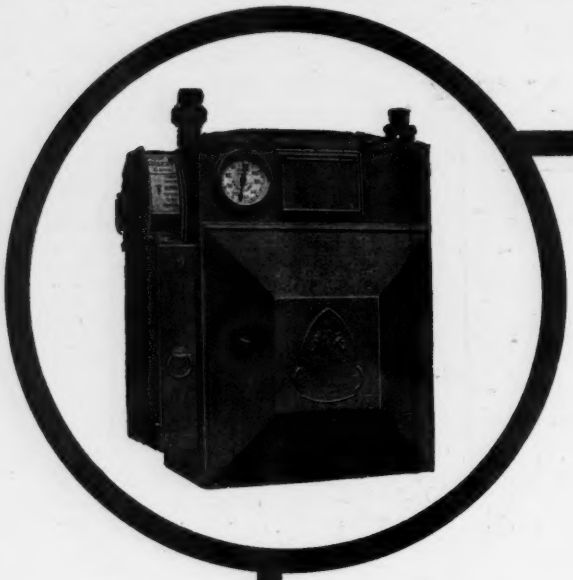

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EDITORIAL NOTES—GAS, &c.

In the Interests of Gas Companies.

LOOKING back over the many annual meetings of the Gas Companies' Protection Association held since its inception, one is not remembered at which members outside the Committee have evinced such a marked interest in the proceedings, or have been more suggestive regarding the future, than was the case at the meeting yesterday week. Such discussion as that which took place can only conduce to greater vigour and usefulness, and probably to an expansion of the scope of the Association's activities. Much good work has been done by the Association; and some of the members seem to think the organization supplies the centre around which further serviceability may be made to grow. We are quite with those who so think, because there is undeniably much work to be done in the interests of private gas enterprise that cannot possibly be undertaken by an organization of composite constitution such as the Institution of Gas Engineers, which incorporates the officials of both gas companies and of municipal bodies owning gas-works, and some of them also electricity supply undertakings. In this fact we have one of the externally-imposed disabilities of the Institution, no matter how much the technical officials of that body in municipal service may personally sympathize with all the objects that stand for the progress and the defence of the interests of the gas industry. It is—and it becomes more marked year by year—through the ownership of competing undertakings on the part of so many local authorities that the defence of gas interests, and the furtherance of projects for progress, are left almost completely at the present day to private enterprise in gas supply. Much the same might be said in relation to the electricity supply interests. A considerable part of the heap of trouble that has arisen in connection with that industry has been due to its domination by municipal policy of a character that had not had precedent in the prior policy applied to the direction of municipal gas undertakings.

The usefulness of the Gas Companies' Protection Association has been illustrated in several ways in the past; and this year has seen that usefulness accentuated in an important manner. But it is quite possible that, if the limits of the scope of activities are drawn too tightly, there will be years with very lean reports of usefulness in which, with a more extensive field in which to exercise existent influence and power, some effective work in directions not now touched might be accomplished. There were the indications of a desire for something more in the expressed wish of members at the meeting to have earlier knowledge than has hitherto been afforded as to the contents of the Committee's report upon the work during the year, and to have, so far as prudence dictates, information as to the replies to questions addressed to the Secretary, in order that, on the one hand, there might be opportunity for a studied discussion of the report at the meeting, and, on the other hand, there might be, from the experience of members, serviceable addition to the information tendered by the Secretary in reply to inquiries. The requests are altogether reasonable, so far as can be seen; and the Chairman (Mr. H. E. Jones) gave a prompt promise as to these matters being considered by the Committee, and the manner of his promise did not suggest that his own immediate judgment saw any difficulty in the way of compliance. It is clear that this would enhance the character of the proceedings at the annual meeting, lift them from something little more than formal, to something more informative, infuse more life into them, and possibly be more suggestive than in times past. But that will not be enough to satisfy some of the members. The first seed has been sown which may germinate, and result eventually in the broadening of the operations of the Association. The seed fell from the hand of Mr. T. H. Duxbury, in connection with the recent issue broadcast of a letter by the Electricity Publicity Committee which was misleading (as has been shown in our columns) in regard to the public lighting of London. It has been nobody's business so far to send a controverting or correcting letter similarly to the press throughout the country; and this shows a present defect in the operative organizations of the gas industry. With the coming into active existence of the Gas Publicity Committee, this particular defect will, we hope, be fully remedied. But the Commitee is not yet at work; and the doing of what the Directors of the South Shields Gas Company suggested that the Gas Companies' Protection Association should do was outside the "scope" of the Association. The Committee of the Association were quite within their rights in declining to take up the matter. But we do feel that, if the Association had stepped into the breach on such an occasion as this, pending the coming into active existence of the Gas Publicity Committee, and without usurping their duties for longer time than their advent into activity, the proceeding would have redounded to the credit of the Association, and shown that it was not a body tethered by an inflexible series of rules. However, there will be no surprise if now the scope of the organization receives some further attention by the members.

It is not at all peculiar that this enhanced interest in the work of the Association has arisen just at this particular time when the Committee had a report presenting some excellent results of work for the year. The report shows, and looking round at the affairs of the industry generally the same thing is seen there, that never in the history of the industry has there been greater need for a Gas Companies' Protection Association, and that of a very active character, and with a broad base. Look at all that has happened in connection with the Standard Burner Bills, and the alertness that has been required on the part of the Association and their Parliamentary Agents who saw these measures through to the point of present success. Their work for the Bills is not yet done; and every gas company in the country who have the interests of the future of the gas industry at heart ought to make representations to their local Members of Parliament with the view to getting the measures through their third reading by an overwhelming majority. Let it be borne in mind as a general axiom that mischief as great may be done by omission as by deliberate commission. On the success of these Bills depends much in connection with future gas company applications to Parliament. The report calls the effect of the opposition on the third reading a "vexatious "delay." It is something more than that. The success of the opposition would mean the destruction of much most excellent work that has been accomplished on behalf of the gas industry. We have not, however, a shadow of fear that the hostility will prove successful; but nothing must be left to chance.

The Committee, it will be seen from their report, has also elicited what is tantamount to a confession, though not a withdrawal of the offending document, that the issue of the circular by the Inland Revenue Authorities, regarding the disallowance of depreciation for income-tax purposes, was a mistake, and that "it is not the desire or intention of the "Board by the circular to remove the question from the "jurisdiction of the District Commissioners of Taxes who "make the assessments." The advice is that those companies who have a grievance in this connection should go direct to the Commissioners to secure what is an undoubted right. It is also shown by the report, in the matter of the taxation of land values, that Form IV. need have no terrors for gas-works owners, as such undertakings are expressly exempt, except in the case of land being sold for which there is no longer use at a higher price than the original cost. As to immediate future work, Mr. Robert Hall, of Matlock, brought before the meeting, the question of the promotion of the proposed Bill to authorize municipal authorities to undertake electric wiring and the supply of fittings. The

Committee have the question now under consideration; but their attitude in regard to the matter remains for shaping on further deliberation.

It will therefore be seen that, though there is a feeling in some quarters that the scope of the Association might be usefully enlarged, this is not by any means due to the want of useful activity in the past. The record of the body, and especially the present report, completely negative any such idea, if it exists.

Commercially Working High-Pressure Gas Supply.

Is the time coming when the gas undertakings in all our principal cities and towns will have in their chief quarters a dual supply of high and low pressure gas? We are of opinion that it is, and that we are within measurable distance of this coming to pass. The gas-supply industry has shown during the last few years a big capacity for progressive work; and this question of carrying a supply of high-pressure gas through the main streets and into manufacturing areas where heat is required in the operations of the factories, is one that will be receiving, we believe immediately, a greater amount of attention than it has had hitherto. London has, as the whole gas industry knows, been doing its part in the work of carrying high-pressure gas through a number of streets as a means chiefly of competing with the flame arc lamp; and in the area round about Fleet Street, this supply has been found of great economic advantage to the printing industry. But it is to Birmingham that we shall now be looking for the results of the expansion of the business of the Gas Department into a general supply of high-pressure gas; and we feel sure that the Secretary and General Manager of the Department (Mr. R. S. Hilton) may be relied upon to keep, for the benefit of the gas industry as a whole, the technical and the commercial officers of the industry informed, either directly or through members of his staff, as to developments and experiences from the inceptive stage of the business to-day, as reported upon in later pages of this issue of the "JOURNAL." It is no mere tentative scheme of high-pressure gas supply that the department has gone in for; but something large, substantial, and permanent. More than this is not wanted to tell and assure us of the confidence of the technical and commercial advisers of the Gas Department, nor to inform us of the liberal manner in which the Gas Committee, with the sanction of the Corporation, have allowed the executive of the department full scope in giving material proof of their confidence in a high-pressure gas supply being of economic value to the industries of the city, and a trading benefit to the Gas Department.

This project, which has, within recent weeks, been unostentatiously brought into active existence, as described elsewhere, is going to be worked in a thorough manner and separately from the ordinary gas supply, though forming an inherent part of the future business operations of the department. But, as a matter of fact, though the primary object of the scheme is the service of the industries of Birmingham in which heat—controllable and always ready for use by the mere turning of a tap and the ignition of the issuing gaseous fuel—is needed, the project has a fourfold intention: It is intended to serve the industries, to boost-up the ordinary supply of gas where required, to light (if the Corporation can be persuaded by demonstration) the main thoroughfares of the city, and to induce any shopkeepers who have a liking for high-power sources of light for their premises to have the high-pressure gas-mains tapped for the purpose. For this variety of use, a margin of pressure somewhat beyond the maximum requirement will be maintained in the system; and regulation to the diverse points of desired pressure will be effected by governors in all situations. The importance of the power that this high-pressure system puts into the hands of the commercial department of the gas undertaking of the city cannot be gainsaid or over-estimated. Without it in such a city, it is easy to see that somewhat stringent limits would be set to commercial activity. It goes without saying that upon the distribution department, the introduction of this additional power has brought a considerable expansion of work; but we shall look, in regard to the commercial side, to the new business serving to prominently mark the inaugural work of Mr. Hilton as Secretary and General Manager, and to crown that of Mr. S. R. Barrett, the Superintendent of the Fittings Department.

It is from the industrial work of this high-pressure gas business at Birmingham that we anticipate most of interest. The city is blessed in the matter of, and it may be said is continuously prosperous through, the range of its metallurgical industries, in all of which a form of heat-raising that has flexibility in the matter of temperatures must be of benefit. But in initiating the application of high-pressure gas to all these various industries, requirements will be so varied that the modes of doing it must also have an extensive range. In the methods of this application, the Gas Department are treading in largely unexplored ways; and therefore the right thing has been done in appointing Mr. E. W. Smith (who has been engaged in the gas-heating research work, on behalf of the Institution of Gas Engineers, at the Leeds University, and will resign it on the 12th inst.) to devote his talents to investigating and demonstrating methods and applications whereby the high-pressure service may be of most utility. In this appointment lies both technical and commercial advantage; and, from the standpoint of the technical worker in the department, we cannot imagine a more interesting, instructive, and profitable new field than this in which an ambitious and active trained experimentalist can be engaged. So far, the experiments of the department (prior to the incoming of Mr. Smith) have shown a simplicity in the design of the means of the application of high-pressure gas to industrial operations, and a wide suitability of high-pressure gas to purpose, which are surprising, and give excellent ground for the fulfilment of expectations. To the new enterprise, we wish, and look for with assurance, an abundant success.

The Carbonizing Maze.

THE difficulties of arriving at some settled conclusions on carbonizing questions as they are spread in glorious profusion before us to-day take pre-eminence of all difficulties that have ever fallen in the path of the gas technician; and we cannot say that the discussion, extensive as it was, at the meeting of the Midland Association last Thursday, has done anything to serve to let light through the mass of conflicting submissions that individual experience and judgment lavishly offer for acceptance. And while this conflict of the advocates continues, we are afraid that each system must be left to work its way forward according to its opportunities. For it must be clear now to all observers who are unprejudiced, and who make disinterested judicial survey of the position, that there are so many problems involved in it all that nothing short of a systematic and expensive investigation by a competent and altogether unfettered tribunal of experts, without favourable prepossession towards any one system, can possibly produce anything like settled conclusion and leading facts from the complexity which abounds. The process of affording any assistance to this end followed by the Carbonization Committee of the Institution, is an unsatisfactory one; and what is required beyond it, as just suggested, is quite outside the region of practical politics in the existing disunited conditions of the industry in relation to co-operative technical investigation. The only hope of relief is that some one or other system will rise so superior in the combination of results to all the others that there can be no further question as to which is the best all-round process for the purposes of the industry.

But taking the position of things as it is in regard to the more prominent claimants for preference, including the most modern methods of working horizontal retorts, it cannot be said that there is such a marked superiority (in the results as we have them before us) between the one and the other—assuming local conditions to be suitable for the application of any one of them—that an engineer can say, with any degree of confidence, that this or that system is absolutely the best for his particular purpose. Those with personal interest in advocating the various systems know the common prevalence of this feeling, without reading the testimony to uncertainty that is the most marked feature of Thursday's Midland debate. But it is for those interested advocates, in the absence of anything better in the way of independent inquiry, to make a determined effort to remove false impressions and set doubts at rest, and to place before the industry modern results from everyday British working conditions. The whole position has attained to such complexity that, at any rate, a statement of the kind from each source would enable us to abandon the confusing mass of information published in the past (which tends to swell mostly by deduction from the conflicting statement and views on record), and give us, as it were, a new starting-point. The "open mind" is still suggested as the proper course; but the "open mind" has been the receptacle into which so much has been forced

in respect of this matter, that it is grievously tormented by the quantity of the opposing material. In truth, the "open "mind" gets tired of remaining open for years in respect of any one particular subject; and, with the flight of time, there inevitably arrives a point at which it has to close, and come to some positive conclusion on the question of procedure through, in this connection, the necessity of renewals or extension. But there is one matter for thankfulness, and it is that carbonization for gas production cannot, under the new circumstances, again drop into the rut in which it stuck for at least a quarter of a century.

However, there is information to be drawn from the proceedings at the Midland meeting, when there were under discussion Mr. A. T. Harris's critical paper (read by him at the spring meeting) on "Carbonizing Systems and Results," in which special reference was made to Love's 45° retorts, and one by Mr. J. S. Lucking, of Clay Cross, on "The Utiliza- "tion of Surplus Gas from Coke-Oven Recovery Plants," and when prepared contributions to the discussion by Mr. T. Glover, Mr. S. Glover, and Mr. J. Ferguson Bell gave principal lead to the general debate. In the first place, it cannot be said that Mr. Harris's experience with Love's 45's will be of assistance in furthering the installation of the system elsewhere; and the fact that at Guildford it has not been adopted in the new retort-house, has not been in its favour. Then Mr. Lucking's experiences with the use of surplus coke-oven gas for general supply—a good enough gas for the purpose, albeit a 13 per cent. content of nitrogen—will act as a warning against such adoption without satisfactory precautions against cessation of the output or variation of the surplus quantity, and against adoption without ample protection, by the provision of stand-by retort plant, in respect of labour disturbances, for coke-ovens are, as a rule, situated where labour is sensitive. Such provision Mr. Ernest Bury, M.Sc., F.C.S., has been careful to make in connection with his Little Hulton gas-supply scheme from the coke-oven plant of the Earl of Ellesmere. Then we have Mr. Thomas Glover admitting that his small chambers on the coke-oven principle have not sufficient flexibility for works of moderate size, though they do possess certain advantages; and he, like his brother (Mr. Samuel Glover), has considerable confidence in the future of the continuous vertical retort system.

So far, we have a little clearance made from the field; but these proposals have only been occupying, so to speak, an experimental place on the border of the larger applied systems and methods of operation over which the spirit of controversy rules. But there is one point on which there is almost common acceptance; and it is that the newer systems and the modern methods of operating the old ones, are the superiors of quondam carbonizing practice. The time has therefore now come when, in the discussion of present-day carbonization, we may forsake comparison with the old (just as we have given up contrasting the incandescent gas-burner with the flat-flame type), and devote attention to comparison between the systems as currently operated in the most approved manner. We cannot understand how anyone can doubt the efficacy (it is not merely a question of foot-candles per ton of coal carbonized) of the heavier charge in producing real and tangible result. There need be only reference to working and revenue statements of certain well-known gas undertakings for the proof. It is found in the quantity and cost of the coal carbonized; in the total production and sale of gas from the coal; and in the ultimate results of the balance-sheet—these being supplemented by the reduced price of gas to the consumers. We may argue about candle-feet per ton and so forth; but such argument will not dispose of the tangible tale of the revenue account. Several undertakings that we have in mind—working under different circumstances in regard to character of coal, size of retorts, and other conditions affecting the carbonizing plant—would not now forsake those new practices that have proved so beneficial to themselves and to the consumers. And this does not apply to large or medium size undertakings only, but to small works such as were referred to by Mr. Berridge and Mr. Ward in the Midland Association discussion. Solid financial considerations such as have been placed before us the last year or two require rather a substantial amount of deposing from the position to which they have attained.

To return, however, for a final word, to the primary consideration as to which is the best of the several systems now courting favour—if there is one that can claim the title. If there could only be some definite conclusion as to which was theoretically the best, then there could be inquiry as to why it did not establish its theoretical superiority in practice. Ascertain the reasons, and then —— well, perhaps there is little benefit to be derived from prediction on such a matter.

Comfort in the Home.

WHILE personally we may lament the brevity of our British summers, that very brevity is unquestionably an excellent thing for the gas industry; and this year again we believe its effect in increased gas output will be shown by the reports on the operations of gas concerns. What we lose on the higher efficiency lamps of the day, is certainly receiving some compensation in the expansion of the heating business, which has a further good effect on capital charges. The brevity nowadays of the British summer extends those periods of the year, preceding and succeeding the season called summer, when there is a chilliness about the atmosphere which, for comfort in the home, we like to have removed. The disposition to increased comfort at home grows on one; and the growth finds a good stimulant in the climatic conditions of the times. There is no doubt that the length of the periods of low temperatures sways and impresses considerably more than the shorter duration of the summer; and therein the gas industry has an advantage in prosecuting the heating business—a much greater advantage than the electrical industry has in promulgating as a consideration advantageous to itself that the use of the electric light, in the summer time, keeps rooms pleasant and cool. The lighting hours in summer are really very few compared with the lighting hours of the year when the temperatures are low, and the lighting hours, too, of the summer are those of lowest temperature during that period.

But the senseless parade of electrical superiority during the few lighting hours of summer has about had its day. The electricians are feeling the effect of public experience; and their own advertising literature is not sufficient for successfully plugging their ears in the effort to keep out the complaints of their patrons as the stuffiness of rooms and headaches where several people happen to be assembled during the time of artificial lighting. This knowledge of a common complaint is reflected by the advice tendered in one of the leaflets (which has been largely distributed) prepared by the Electricity Publicity Committee, in which electric fans are spoken of as being "indispensable for "keeping the house healthy." We have also before us an advertisement issued by the Beckenham District Council Electricity Department in which it is remarked that "wherever electric light is installed, the air of the rooms "can be kept cool and pleasant in the hottest days by means "of electric ventilating-fans." Just so; but fans cause an additional expense, and they are not altogether free from a buzzing noise that is somewhat irritating in the otherwise quiet rooms of the home. But that by the way.

Apart from the question of a supplementary and indispensable aid to the electric light to keep atmospheric conditions comfortable and wholesome, electricians cannot have their recommendation as to the coolness and pleasantness of electric lighting applying to all seasons. Side by side (in the same local paper) with the Beckenham electricity advertisement is a more prominent one of the South Suburban Gas Company, headed "How to be Happy and Comfort- "able at Home," and succeeding the comfort, convenience, and economy of the gas-fire are set forth. It is interesting to note at the end the warning and information: "The "rush for gas-fires this winter is sure to be great. Already "the Company have fixed 5000 of them, and orders are "coming in for them at the rate of 70 per week. To save "delay and disappointment, therefore, it is well to order as "soon as possible." Assuming (and it is only an assumption in view of the Electricity Publicity Committee's statement) that the electric light is cool and pleasant in the summer time, and that it does not require any auxiliary aid to maintain the air of a room in a sanitary state by changing its quiescence into activity, then it cannot be such a valuable adjunct in the home—both economically and healthfully—during the longer period of lower temperatures. The point was made at a recent meeting of the Stoke Newington Borough Council, when the account for gas supplied to the Public Library was brought forward. One councillor asked why, if "electricity was cheaper than gas," it was not used in the library. The reply of Alderman W. S. Wright was that the reasons for not making the change were the cost

of altering the fittings and the usefulness of gas for heating purposes. And his experience was that electricity was not cheaper than gas. This is not an isolated case of the recognition of the heating utility of gas lighting.

As a matter of fact, the use of electricity for lighting makes the question of heating one of greater importance; and (in addition to the cost of the electric ventilating-fan) it supplements the heating expenses of a house. The experience of one well-known Gas Company, in a limited portion of whose district electricity has been adopted for lighting to perhaps a larger extent than in any other area in the country, is that, in the territory in question, the electric light has been an effective force in impelling the adoption of gas-fires. And it comes about through the users of electric light missing the genial warmth of their gas-burners in the evenings of the early autumn and in springtime, when the air of the evening for comfort's sake, when sitting indoors, requires its chilliness removed. The convenience and utility of the gas-fire (the electric light not being a recommendation for electric radiators) for this purpose among electric light users is becoming very largely appreciated; and their introductory use in this way and for this purpose educates, and at length they have come to be looked upon as indispensable. As a consequence, in many electrically lighted houses (with cooking-stoves in continued service from a period prior to the advent of the electric light), gas bills have shown an ascent and not a descent. In such instances, electric lighting is a friend in disguise.

This is an age in which progress ministers more and more to human comfort; and it is of the nature of humanity not to be adverse to the movement, but rather to give to it the encouragement of its patronage.

Conference on Gas-Heating Research.

Those who are alive to the principal direction in which there is going to be large commercial expansion for the gas industry cannot fail to highly appreciate the work that has been done, through the Gas-Heating Research Committee, at the Leeds University. This work has expanded knowledge, and has made without doubt its mark on gas-fire production by raising the standards to which the gas-fire makers have to work. The Committee desire to make their work of the utmost value by taking counsel with all who are interested in the lines of the research and the problems involved. In pursuance of this desire—it is learned from a letter received from Professor Arthur Smithells, reproduced in our "Correspondence" columns—arrangements have been made for an open conference of all interested (whether gas-engineers or gas-fire manufacturers) to-morrow week, Nov. 9, at the Leeds University. No further invitation than this is necessary; but it would be useful if those who intend being present will send an intimation to that effect to Professor Bone at the University. We are particularly glad to see at this time the announcement regarding this conference, as there is promise in it that there will be no break in the work the Committee have in hand, in consequence of the fact that Mr. E. W. Smith (who has been conducting the research) has received and accepted a "call" to a new field of labour in connection with the Birmingham Corporation Gas Department's new enterprise in high-pressure gas supply, to which reference is made in an earlier leader column and in a special article later. The conference will be (so to speak) the occasion of Mr. Smith saying "farewell" to the work on which he has been engaged, and engaged with so much industry and ability and personal credit. A summary of the work that has been accomplished, and an account of the questions involved in it, to be presented at the conference, will be his final duty in connection with the work of the Committee; but he will in effect be only transferring his services from one promising field of the gas-supply industry to another, and this the one in which there is a large amount of initial work awaiting the competent hand. We hope the conference will be a large success.

Manchester District Institution.

We cannot to-day, owing to pressure of time and the claims on our space, notice editorially the final event of the past week for gas engineers—the visit of the Manchester District Institution of Gas Engineers to Stretford. There will be a return to the proceedings next week; but meanwhile a full report is published elsewhere. We must, however, take this the earliest opportunity of saying how kindly and generously the members—who were present in excellent number—were received by the Chairman (Mr. Lewis Galloway), Vice-Chairman (Mr. Nicholls), and Directors of the Stretford Gas Company. When good nature and courtesy are evinced in such manner and on such an occasion as on Saturday, it is a sure sign that between the members of a Board of Directors and their chief technical officer there exist absolute confidence and friendly feeling. This is the condition of affairs at Stretford between the Board of the Gas Company and their Engineer and Manager (Mr. H. Kendrick); and the results were seen by the visitors on all hands. There was good speech-making after lunch; and the proceedings at the afternoon's meeting were extremely interesting—one feature being the discussion of the highly suggestive Presidential Address delivered by Mr. Kendrick at the February meeting.

Municipal Trading in Germany.

Of recent years, municipal trading has received a considerable set-back in Germany; and this is not to be wondered at when it is seen what enormous revenues can be obtained by municipalities who make judicious arrangements for the leasing of so-called public services to private undertakings. The city fathers of Berlin, for instance, do not appear to believe in municipal trading where it can be avoided; for, though they have for many years possessed gas-works of their own supplying a portion of Berlin, a considerable area is served by a Private Company, and both the electricity supply and the tramway service are in private hands. For the year 1909, these undertakings paid into the municipal coffers the very large sum of nearly ten million marks by way of fees for the use of the streets and percentage on profits, made up as follows:—

Gas Company	608,031 marks
Berlin Electricity Works	4,916,445 ,,
Berlin Tramway Company	3,344,090 ,,
Charlottenburg Tramway Company	83,572 ,,
Siemens Tramway Company	80,783 ,,
South Berlin Suburban Tramway Company	20,497 ,,
West Berlin Tramway Company	23,055 ,,
North East Berlin Tramway Company	12,282 ,,
Overhead and Underground Electric Railway	126,690 ,,
Public Advertising Stations	415,600 ,,
	9,631,045 marks

This very considerable revenue is received by the town without their having to provide or risk a pennypiece of capital, or having to create and maintain an army of functionaries, officials, and workmen—in short, they have all the benefits, without any of the disadvantages, attaching to the carrying on of these public services. The municipal trader will, of course, retort that the public suffer by having to pay higher prices than they would do were the services in the hands of the Municipality direct. Unfortunately for this argument, it happens that both the town and the Gas Company charge the same prices at Berlin. The chief point which the municipal trader overlooks, or refuses to see, is that a private commercial company can always work more cheaply than a public authority—a point of which we, in England, have recently had a very good illustration in connection with London Water Affairs.

Lead Poisoning on a Gas-Works.

Many strange points have called for judicial decision since the passing of the first Workmen's Compensation Act; and though, of course, the wider scope of the latest Statute dealing with the subject has somewhat lessened the chances of dispute, there are still, it would appear, plenty of arguable questions left. One of these has come before Judge Harington at Wandsworth County Court; and it has been thought worthy of reporting at length in the "Legal Intelligence" in this issue on account both of the unusual circumstances of the claim in connection with the gas industry, and of the interesting nature of the answer put forward. The applicant for a compensation award for total disablement was a man who had for a great number of years been in the employ of the Wandsworth and Putney Gas Company as a fitter; and it was stated that his work of making joints involved the continuous use of lead in different forms—red lead, white lead, and molten lead. In September of last year, he was engaged near the roof of a new meter-house on the 24-inch inlet and outlet mains of a station-meter; and the allegation was that he developed lead

poisoning from the fumes of the molten lead, from which he was unable to escape. The Company, in view of this being an isolated case, and of the fact that there appeared to be plenty of ventilation in the meter-house at the time the man was taken ill, looked about for a possible explanation. They were medically advised that the applicant could only have been poisoned by taking the lead into his mouth; and evidence was forthcoming that he had been known to chew tobacco. Under these circumstances, they felt it their duty to contest the matter, on the ground that putting the tobacco in his mouth with his hand would account for his getting lead poisoning where others had not, and that therefore the disease was not "due to the nature of the employment," but to a habit which the man had acquired for himself personally. For the applicant, a doctor said one could get lead poisoning from absorption through the skin, by inhaling or by swallowing; while for the Company, a medical man from Harley Street stated that lead paint or putty on the hands would not affect a person through the skin as the applicant was affected. The man himself, when in the box, told the Court that he had not chewed since 1908; and that when he did do so, he had not taken pinches of tobacco when he had lead putty or paint on his hands. This statement the Judge said he accepted; and he expressed himself satisfied, after hearing the evidence, that the poisoning was due to the nature of the work on which the applicant was employed. "Even supposing," he added, "it had been contracted because he happened not to have his hands quite clean—though it is not necessary to decide this point—in my opinion that would not have deprived him from obtaining compensation." He therefore awarded the applicant the £1 per week asked for.

The Spirit of Unrest.

The manifestation of the feeling of unrest in the South Wales coalfield nowadays seems to be only a question of degree. More or less, it is always with us; but at intervals of time—generally very shortly separated from one another—the trouble threatens to come to a head. Those sectional strikes which have been straining so much the organization of the Conciliation Board, are continued as light-heartedly as ever; and one wonders how long the present unsatisfactory position can be maintained. Within the last few days, the trouble has again become acute; and there is ample evidence that a section of the men do not regard the prospects of a severe fight with any feelings of aversion. No doubt, these are the younger and less responsible miners; but in a public meeting at which a course of action may be decided upon, they are likely to be the most demonstrative element. In the Aberdare Valley there are already a lot of men out; and it is possible many thousands more in the Rhondda may also be idle this week. The coalowners, in fact, we are told, take a very grave view of the immediate outlook. It is pointed out that on previous occasions during the past two years when meetings of the owners have been convened to deal with labour crises, there have been differences of opinion on questions of general policy; but at a gathering which was held last week to discuss the situation, absolute unanimity prevailed, and a determination was expressed to deal firmly with what is generally regarded as an intolerable state of affairs. The decisions arrived at have not been disclosed; but a correspondent of a local paper states that there is good reason for believing that the Association pledged themselves up to the hilt to support by indemnity those owners whose collieries are now idle or are likely to be rendered idle this month under notices served by the workmen. It was said by one of those present that never since the existence of the Association had there been so united and determined a spirit displayed by the members, and that they were not only ready, but fully prepared, to deal with any eventuality that may arise.

Gratifying evidence has lately been afforded that the articles which appeared in the "JOURNAL" for the 18th ult., on the substitution of gas for electricity by the Society of Medical Officers of Health, have been appreciated. Reprints of the articles have been supplied to several gas companies for distribution; and Mr. John Young, the Engineer and Manager of the Hull station of the British Gaslight Company, Limited, has sent us a card which he has had prepared, setting forth in prominent characters the important fact that "doctors agree that gas is supreme," as shown by the action of the above-named Society. The card is 12 in. by 10in., the concise statement upon it is printed in red and blue, and there is a flap at the back to support it when standing upon a show-room table. It is another vehicle for publicity.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 346.)

THE feature last week in the Stock Exchange and in financial circles was the fall in Consols to a price untouched for half-a-century or more. The barest discussion of the causes is beyond the scope of this article; but one thing is certain, and it is that prices can be "talked down." Market value is the credit a security enjoys in the public estimation; and if sufficient people will but unite to alarm each other, the fall is an automatic certainty. Last week opened in an anæmic sort of condition, and the general tone was weak, though Rails were fairly steady. The gilt-edged class suffered, and Consols began their downward course with a fall of ¼. Tuesday was dull and heavy; and one failure (it was account week) was a disagreeable reminder of sinister possibilities. Consols fell another ¼; and there was scarcely a firm spot anywhere. On Wednesday, Consols were done at $78\frac{13}{16}$; but later prices were a little better, and the net loss on the day was no worse than ⅜. Most other markets were sympathetically affected; but Rails were not much hurt. On Thursday, business was still quiet and cautious, but inclined to brighten up a bit. Consols steadied, and Rails improved. Americans shaped better; and in some miscellaneous lines there were advances. Friday made a good show of cheerfulness, though some realizations before the close brought the last prices down below the best of the day. Government issues rose in response to inquiry. Rails were quite strong, and Americans improved. Saturday was very quiet; but the tone was good, and Consols rose ⅛. The Money Market was hard at first in face of a strong demand, but relaxed later on when the supply was largely augmented. Discount rates closed easy. Business in the Gas Market was quieter and rather dull—as might be expected in such an agitated week. Very few quotations made any change, but the tendency was rather inclined downhill. In Gaslight and Coke issues, the ordinary receded another half-point, with transactions ranging from $105\frac{7}{8}$ down to $104\frac{1}{4}$. In the secured issues, the preference was a point easier at from 104 to $104\frac{1}{4}$, and the debenture was done at 81. South Metropolitan was quiet at from 121 to 122; and the debenture changed hands at $81\frac{1}{2}$. In Commercials, there was one bargain in the 4 per cent. at $107\frac{1}{2}$, and one in the 3½ per cent. at 103. Among the Suburban and Provincial group, Alliance and Dublin advanced 1, and the debenture was done at $97\frac{1}{4}$. Bournemouth "B" realized $16\frac{3}{16}$, Brighton original $215\frac{1}{2}$, and ditto ordinary $158\frac{1}{2}$. On the local Exchanges, Liverpool "B" was done at 164, and Sheffield "C" at 230, while Newcastle and Gateshead rose ¼. In the Continental companies, Imperial was unchanged at from 187 to $188\frac{1}{2}$—figures unaltered for three weeks. Union marked $96\frac{1}{2}$ (a fall of 1), European fully-paid $24\frac{1}{4}$, ditto part-paid $18\frac{1}{2}$, and Tuscan $9\frac{3}{16}$ and $9\frac{3}{8}$. Among the undertakings of the remoter world, Bombay changed hands at 6½, Melbourne $4\frac{1}{2}$ per cent. at $100\frac{3}{4}$, Monte Video at $12\frac{5}{8}$ and $12\frac{7}{8}$, Oriental at 140, Primitiva at from $7\frac{3}{8}$ to $7\frac{9}{16}$, ditto preference at from $5\frac{5}{16}$ to $5\frac{3}{8}$, and San Paulo at $15\frac{5}{8}$ and $15\frac{3}{4}$.

ELECTRICITY SUPPLY MEMORANDA.

Conflicting Interests and Influences—Library Lighting and Intelligence—Flame Arcs and a Doubtful Future—Poor Dwellers and Poor Lights at High Cost.

THERE is no question about it that the Incorporated Municipal Electrical Association are missing no opportunity for getting fresh recruits to the ranks of those local authorities who are prepared to give material support for the Electric Wiring and Fittings Bill that it is proposed to promote under the ægis of the Association. There have been special attempts to stir up the waverers—those local authorities who are halting before a decision as to whether they shall financially or merely morally support the measure, and those who are hesitating as to whether it is more politic to upset the Municipal Electrical Association or the local contractors for electric wiring and fittings. There are so many influences brought to bear, that forsooth some of the local authorities cannot determine what to do. Their electrical engineers tell them the municipal undertakings are languishing for these powers, so indirectly suggesting that the undertakings are in a very anæmic condition, and that nothing can brace them up again but the free wiring and fittings powers. Experience from other places tells of this extension of municipal powers (where obtained) having been fruitful of loss; and there are future meetings with ratepayers to be thought of if any adoption of the new scheme results in similar financial failure. Then the Municipal Electrical Association say: "Come and help us to get this power, which we mean to have to spite private enterprise in gas supply and private enterprise in electric wiring and fittings, and to the four winds or to the ratepayers' pockets with the consequences, and to Halifax, Hull, or some other place with the Electrical Contractors' Association." Then the local electrical contractors appeal to those tradesmen on the councils to respect private enterprise, and to let competition with the gas company mark the limits of municipal operations in this regard.

So between conflicting influences and interests there are many local authorities who do not know precisely what to do. But encouragement is being given to those who are faltering to come

in by statements as to a fairly considerable sum having been promised by other authorities for the contest; but the individual sums that we have seen promised have not been striking for their generous character. Doubtless to a few conscientious councillors there is something repulsive about spending any considerable sum in fighting for powers to deprive a local ratepayer of his business. However, the Municipal Electrical Association must have learned ere this that combination fights of this character are expensive things, when there are resolute opponents defending their private interests against bodies originally created for the express purpose of safeguarding the common interests, but who are now using their position for malignantly attacking them. At the same time, the Electrical Contractors' Association are now girding up their loins for the fray. They have been successful hitherto in this matter. They have to meet the now frenzied victims of their success. In Parliament and in the Law Courts, the Association have won; and the more the enemies of private enterprise are repulsed, the more vigorous do they renew the attack. Hence the Bill. The Ironmongers' Association will take part in opposing it, if the Municipal Electrical Association consider the support received is sufficient for them carrying a contested measure through Parliament. The Gas Companies' Protection Association are also looking into the question as will be seen by the report elsewhere of the proceedings at the annual meeting of the members. Everything seems to be shaping for a big fight for and against an extension of municipal trading into what has been proved to be a highly speculative business.

The librarian of the Deptford Borough Council is a person it would be worth one's while to meet for an interesting little chat. There has been some question as to the system of lighting that shall be adopted for the library in course of erection at New Cross Gate. The librarian is of opinion that gas has a very injurious effect upon books; but he does not state his reasons for taking upon himself the responsibility for the resurrection of this statement, which we had thought had been made for the last time long ago—since people have found that the processes of making leather bindings are not altogether free from fault in this matter, and since it has been found that where no artificial light is used in libraries or where electric light is employed, book bindings are not immortal things, and that they go the same way as the bindings of books in gas-lighted libraries. We suppose a librarian who is so pronounced in his opinion that "gas *has* a *very* injurious effect upon books" will next ask that it be made a condition precedent to issue that borrowers should have electric lighting installed in their houses. We take it that at Deptford, as elsewhere, the books whose bindings wear out the quickest are those that are the most popular, and those that are the most popular find rest in the library for only short intervals. There is a good deal of nonsense talked about this question of library lighting, and it has formed a subject for discussion frequently in these pages—in days lang syne. The Deptford librarian has not to go far from his own centre of useful labour to find other library buildings where gas is used, and in which the wear of the bindings of books is about normal. But in the lighting of libraries there are other questions to be considered, besides the bindings of books—there are the eyes of the readers in the library, which are more important than book bindings. And those eyes want a good light, and the light which suffers least from the fault of glare. For the lighting of the library, the London Electric Supply Corporation, Limited, offered 1830-candle power for £34 a year; the South Metropolitan Gas Company 6600-candle power for £42 5s. The measure between 1830 and 6600 candle power ought surely to have made the most economically inclined willing to pay the additional £8 5s. to the Gas Company with the greatest of pleasure and benedictions on their head for providing such an economical light. If the Gas Company think 6600-candle power necessary for the library, then we can see, if the Electric Light Company only put in 1830-candle power (the Council, after much hesitation, having adopted their tender), there will be such a demand for more light that the electricity account will reach to more than the Gas Company were asking, and for far less illuminating power than gas offered.

The contribution to literature in the lighter vein with which the "Electrical Times" favoured its readers less than a fortnight ago contained an article on "Arc Lamps," reading between the lines of which it is easy to see that the writer is not comfortable in his mind as to their future. The policy of our contemporary is to deride all progress in gas, and to sing loud the praises of everything that is electrical—from a new switch upwards. In this article, however, on "Arc Lamps," there is doubt as to their future. "During the next few years," it is remarked, "the arc lamp will pass through one of the most critical periods in its existence." In stating the causes for this, the writer very properly gives first place to the high-pressure gas-lamp, and second place to the metallic filament lamp. But this is how the relative position in importance is stated: "Beset as it [the arc lamp] is by the somewhat feeble opposition of a practically untried, but gorgeously advertised, competitor in the high-pressure gas-lamp, and by its more to-be-feared stable companions, the high candle-power tungsten lamp and the improving mercury vapour lamp, the ordinary pattern arc lamp will not maintain its position without a struggle." This certainly does not look at all promising for the flame arc lamp, which is the best thing the electrical industry can put forward as the arc lamp champion. Materially assisting to this conclusion have no doubt been the demonstrations made between high-pressure inverted lamps and the various types of electric arc lamps. It must, for instance, give electricians quite a nasty shock to turn out of Victoria Street, Westminster, into the Vauxhall Bridge Road just at the present time. It is also interesting to note that "any revolutionary change" in flame arcs "can only be expected from an equally revolutionary departure in the design of lamp, or in the manufacture of the carbons." So we know where we are for the time being in the matter of the competition that has to be met. But the flame arcs of the day have still their acknowledged defects; and the ordinary ones suffer seriously from their short burning hours. But there are the magazine forms of lamp, in the making of which "the troubles experienced have been many;" and we trace a sort of non-committal tone in the words "we believe that the magazine lamps now being offered can command every respect." The electrical readers of the article will have wished that the writer could have adopted a more positive and hope-inspiring tone.

In his last annual report, Mr. A. H. Seabrook stated that the number of new consumers connected during the twelve months was 600, compared with 300 the previous year; and that, though the value of the revenue per consumer was smaller, the establishment charges were nearly as heavy. The drop in the average price obtained per unit goes on, while the costs of production do not show a downward tendency at an equal rate. These facts indicate the direction in which many electric undertakings are drifting, and not to the advantage of their finances. Another report shows us how the Department are securing, in what appears to be an undignified manner, some of their business from the poorer inhabitants in the district. It is not only compulsory public lighting in the Marylebone district as a result of municipal trading in electricity there, but it seems—at least so we understand the report [we shall be pleased to publish the denial if we have misinterpreted what is here stated]—that the occupiers of John Street Dwellings are also being compelled, by arrangement with the Improvements and Housing Committee of the Borough Council, to take electricity, and at a rate which will show prepayment gas consumers what are the notions of electricians as to what they ought to pay for the so-called cheapest light provided by electricity. The charges are: 7d. per week per lamp (sitting-room), 5d. per week per lamp (bedroom, with metallic filament lamp), or 3d. per week per lamp with carbon filament lamp. Now why is that gormand the carbon filament lamp charged less than the metallic filament? We do not know the candle powers of these lamps; but the prices per single lamp are pretty steep for poor people for each room, though the charge is inclusive of installation and maintenance. In no case, it is remarked, is there more than one lamp in a room. Poor dwellers! But these people have had something else to contend with. They probably have to put up with having the electric light, but they have kicked against being deprived of their gas cookers. But why? Has not it gone forth from Marylebone that cooking by electricity is as cheap as cooking by gas. However, this is what the report says: "The situation has been a little complicated by the action of the Gaslight and Coke Company in removing their meters and heating apparatus. In case this were done, we had already agreed a course of action with the Improvement and Housing Committee, which would immediately put the tenants in a position in no way inferior to that occupied in relation to the Gas Company. We give them the choice of retaining their gas cooking apparatus on the same terms, or of having an electric heating plate to answer the same purpose. The Gas Company are, of course, bound to supply gas to the dwellings; and those tenants who do not prefer electricity for cooking purposes will be supplied with gas and apparatus on hire as before, only by the Council." The position is an interesting one not only for the tenants of John Street Dwellings, but for onlookers who will be curious to see how long (if our surmise is correct) the dwellers will put up with despotic government of this kind. What is municipal management of electricity concerns descending to, and how much greater will be the descent?

Yorkshire Junior Gas Association.—At the opening meeting of the Association for the present session, a report of the proceedings at which appeared in the "JOURNAL" for the 18th ult., Mr. J. E. Sutton, of Bradford, was elected Hon. Secretary. We learn, however, that he is unable to take up the duties, and that Mr. E. Garsed, of Elland, the Hon. Treasurer, will do so; the position that he relinquishes being filled by Mr. C. H. Turner, of Mirfield.

Institution of Civil Engineers.—The first ordinary meeting of the Institution for the session 1910-11 will be held this evening, when the new President, Mr. Alexander Siemens, will deliver his Inaugural Address, and the medals and prizes awarded by the Council for papers will be presented. The business will be followed by a reception by the President in the library. The foundation stone of the new building, particulars of which have already been given in the "JOURNAL," was laid last Tuesday by Mr. James C. Inglis, the outgoing President. The site is at the corner of Great George Street and Princes Street, and consequently on the opposite side of the road from the present building. In the course of the proceedings, Sir William White stated that when the present building was erected in 1894, the membership of the Institution was 6621, whereas at Midsummer last it was 9053. On the basis of numbers, therefore, greater accommodation was required, and this would be provided in the new premises.

TRADING IN HIGH-PRESSURE GAS IN BIRMINGHAM.

THE Birmingham Corporation Gas Department will be able henceforth to claim that they were the first, among provincial industrial cities and towns, to appreciate what a really important factor high-pressure gas is destined to be in the future in the economic methods of industry, and, so appreciating, to afford to the manufacturers of the city a general supply of high-pressure gas on tap at all hours of the day. The City Council have endorsed the desire of the Gas Department to be of the greatest possible service to the city in contributing to the conveniences and economies of its industries; and the department, on their part, have not proceeded with the matter in any niggardly spirit, for the system they have put down, and will extend as opportunity suggests, is of a character that shows that real and permanent business is intended. So much so is this the case, that offices and demonstration-rooms will, in the course of about ten days, be specially devoted to the high-pressure business; and Mr. E. W. Smith, of gas-heating research fame at the Leeds University, is to be the presiding technical head of this sub-department, for the purpose of devoting his knowledge to ascertaining and advising on the requirements of manufacturers and experimenting as to the best means of effecting their processes by means of high-pressure gas. From this it will be seen that serious business, commercially and technically, is in view, and that it will not be long before manufacturers will see that the Gas Department heartily deserve their thanks for the time and money economies and conveniences that they are providing for them.

The Secretary and General Manager of the Department (Mr. R. S. Hilton) and the Superintendent of the Fittings Department (Mr. S. R. Barrett) are, as indeed are all the officials, very enthusiastic over this new departure; and in an interview with the gentlemen named last week, many interesting particulars regarding it were obtained. In the first place, as to the compressing plant and distribution system. There have been installed at Windsor Street works two Worthington compressors, capable of supplying 60,000 cubic feet of gas per hour each, at a pressure of 15 lbs. per square inch. The leading main from these compressors is 18 inches in diameter; and there are already 7 miles of main laid. The smallest main is a 6-inch; and an important part of the system is about 3½ miles of 12 inch main running from the centre to King's Norton. But this main represents a distribution convenience as well as an industrial advantage, as, running out to a part of the border of the general supply area where the mains are somewhat small, the general supply can, through a governor, be strengthened. This, of course, as has been generally recognized, is a cheap means of securing a distinct benefit. It is interesting to learn that for this high-pressure supply, the Gas Department have adopted cast-iron mains (with lead joints carefully made, and the pipes a little longer in the spigot and socket); and as they have been tested up to 30 lbs. per square inch, they may be relied upon to stand any pressure demanded of them. The department felt that the tests fully justified their selection of cast-iron pipes. Of course, the system as it exists at present will be subject to many ramifications, as it is not the intention of the department to deny the advantages of the high-pressure gas to any part of their area to which it can reasonably and profitably be carried.

While speaking of piping, a word may be said as to internal fittings for the use of the high-pressure gas. Brass is found to be of no use; and so gun metal is employed. In some cases solid-drawn copper tubing is used; but weldless steel is now being substituted. It must be remembered that the department are as it were starting *de novo* in this business, so far as the application of high-pressure gas to their industries is concerned; and they have had to feel their way, make all their own experiments, and come to their own conclusions in every respect. For this detailed work (Mr. Hilton privately mentioned to the writer) a great deal of credit is due to Mr. Barrett.

Then as to the pressures in the mains, the department are arranging for this to be at a height that will exceed the maximum required by any manufacturer. One may want a pressure of 100 inches, another 150, another 60; and governors will stand guard to see that the various customers get just what they want. The Department, in fact, guarantees a constant supply at any pressure arranged for; and already negotiations and inquiries are plentiful.

It is not intended to convey by what has been said that the department has not before this had experience of high-pressure gas. It has had for some three years a plant for experimenting and lighting. But the present scheme is something altogether different; and within the past few weeks the first commercial installation has been connected up to the new system. This is at the Birmingham Aluminium Company's works. There they have installed a furnace to be heated by the high-pressure gas for melting aluminium alloy, which is used for casting motor gear cases and things of this kind. For the same purpose, they have hitherto used blast-furnace coke. In making the change from the one fuel to the other, they have simply taken the same pot, put in a fire-clay lining, and made holes in the sides through which the gas plays on to the pot. The Company are very pleased with the change that has been effected, because they get perfect regulation of the heat (which is of importance to them); and furthermore there is no difficulty regarding oxidation of the metal, which oxidation is reduced considerably by the gas flame as compared with the coke flame. They also find that in melting-up the scrap aluminium or shavings they can recover about 75 per cent., instead of about 25 per cent. as under the old method, in which the oxidation was so great that it practically destroyed the value of the shavings or chippings. It is a great point in favour of the high-pressure gas flame that it is not an oxidizing one; and another valuable thing with the high-pressure furnace is found to be that, while the whole of the products of combustion are sent out at the end of the furnace—a furnace such as is used for pipe or bicycle rim brazing—at the open or working end there is no cooling by the inrush of cold air. This was demonstrated later on a visit to the experimental room. The variety of purposes to which they are confident the new service will be applied in the way of annealing and hardening were explained by Mr. Hilton and Mr. Barrett; and one could not but agree with them that unquestionably the Gas Department have done the right thing in entering upon this new enterprise.

It was further explained that for ordinary crucible work the adoption of high-pressure gas is the simplest thing in the world; and so it is for all hand blowpipe work. Another advantage is that it is so safe. There is no lighting-back, and no explosion when the gas is turned on; and when the temperature rises beyond a certain point, it can be immediately reduced, and thus constancy be ensured. The simplicity of the whole of the fittings is another commendation. For example, the burners are nothing but a piece of gas-pipe with a jet on the end. The high-pressure gas does all the rest—taking for itself all the oxygen it requires out of the atmosphere; and, burning in the open, it produces a highly oxidizing flame.

The measurement of the high-pressure gas was a problem to be dealt with—seeing that, with the pressure given in Birmingham, the volume of the gas is reduced by one-half. What has been done is to introduce a meter with an automatic compensating arrangement, whereby the measurement can be reduced down to ordinary gas pressure, or (say) 3 inches water pressure. The arrangement referred to is a beautiful and reliable piece of apparatus. It has been designed by Messrs. Parkinson and W. & B. Cowan, Limited, and is on the aneroid barometer principle. To say the least, it is a very ingenious arrangement. Mr. Barrett has also designed an automatic safety shut-off valve for all high-pressure services—lamp or otherwise. It is really an improvement (Mr. Barrett modestly says) on a device that has previously been in use in America. The valve comes into operation on a sudden demand being made for high-pressure gas in excess of its capacity. If this happens, it would be through accidental fracturing of a pipe, or some other casualty; and so safety is ensured by its use on every high-pressure service.

In addition to industrial supply, the high-pressure system is going to be tapped for public lighting purposes; and the first trial is to be made in Stephenson Place and Victoria Square with high-pressure inverted burner lamps of 3000-candle power, arranged on standards 18 feet high from the pavement level. The contracts are divided between the James Keith and Blackman Company and Messrs. Thomas Glover and Sons. In this first trial, there will be ten standards carrying single lamps, and a double standard carrying two lamps. The lamps will be controlled by means of a doorway in the base of each standard. A ½-inch service will go to each lamp; and the pressure, whatever it is, will be broken down to 100 inches by means of a governor that is visible on opening the door. Two taps are also seen; and it is learned that one of these controls one burner in the lantern, and the second tap the other burner. There is also adjacent a screw adjustment for controlling the bye-pass. This arrangement of dual taps will allow of one burner being turned off at midnight. It is seen that in connection with the fittings every precaution has been taken to ensure constancy. For the supply of the burners, solid-drawn copper tubes run up the columns, which by the way are handsome, and are the work of Messrs. Macfarlane and Co., of Glasgow.

Before leaving, the writer was taken by Mr. Barrett to a basement room at the gas offices, where the high-pressure experimental work has been proceeding. A furnace and crucible are fitted there, and blowpipes of all kinds are lying about for demonstration purposes, be the work of large, rough character or the fine and delicate work of the operator in precious metals. The exceedingly high temperatures that can be quickly and economically obtained in furnace or crucible or otherwise were observed. The gas is supplied here at rather more than 50 inches pressure; and, consuming about 300 cubic feet per hour, a temperature of 1100° Fahr. was being obtained in the furnace, using three simple burners on each side. The crucible, as employed in the melting of copper, was seen at a temperature of 1150° Fahr. But what was astonishing was that such great effects were obtained by such unpretentious and inexpensive means; and another thing was the flexibility of high-pressure gas in getting just the temperature required. The safety of the employment of the high-pressure gas under the devised arrangements is demonstrable in this little installation.

Then the writer was taken to the Aluminium Company's works; and he there saw what had been done in fitting-up the premises

for the use of the high-pressure gas. The large crucible which is heated by this means was seen, and in which, starting cold, 1 cwt. of aluminium can be melted in 65 minutes. The saving is in factory time, and in the increased output of the plant, compared with the old conditions—the latter representing a 20 per cent. increase during the working day. The safety-valve is situated by the meter; and this automatically shuts off the supply should at any time an accident befall the inside service.

To Birmingham and its neighbourhood much is due in connection with the gas industry; and in this general distribution of high-pressure gas, it is once more showing its pioneering spirit, though what has been done in London must take precedence in the matter of time, if not in the character of application.

PERSONAL.

Alderman W. T. Heap, J.P., who has been Chairman of the Water Committee of the Rochdale Corporation for the last twenty years, is to be invited to occupy this position for another term.

In the "Journal" for the 27th of September we recorded the death, on his way to England from South America, of Mr. Herbert Gandon, the Engineer and Manager of the Ceará Gas Company, Limited. It will be seen, from the report of the proceedings at the annual meeting of the Company on Friday which appears elsewhere, that the Directors have appointed as his successor Mr. John Reid, who is, they say, an old and reliable servant of the Company.

At a farewell gathering held last Friday evening, Mr. Robert Wardell, who is relinquishing the post of Assistant Fittings Superintendent under the Birmingham Corporation Gas Department to take up the position of Assistant-Engineer of the Cambridge Gas Company, was the recipient of a variety of useful presents from the officials, fittings staff, and gas-fitters of the Birmingham Gas Department. In the comparatively short time Mr. Wardell has been in Birmingham—less than two years—he has apparently won the respect and affection of all with whom he has been brought in contact; the meeting on Friday being a crowded and most enthusiastic one. A very enjoyable musical entertainment was given during the evening by members of the fittings staff and the gas-fitters. During the interval, Mr. S. R. Barrett, Fittings Superintendent, who presided, asked Mr. Wardell's acceptance of a handsome Sheraton music cabinet subscribed for by the officials and fittings staff, and of the following useful gifts from the gas-fitters: A slide-rule in case, with magnifying prism; a copy of O'Connor's "Gas Engineer's Handbook;" and an inkstand. Mr. Barrett was supported by Mr. A. W. Tooley (the Office Superintendent) on behalf of the officials, and Mr. S. Watts on behalf of the gas-fitters, both of whom paid eloquent tribute to the esteem and affection which Mr. Wardell had won from those under him during the short time he had been with them, and wished him every success at Cambridge. Mr. Wardell, in the course of his acknowledgment, stated that Birmingham had always held a foremost place in the gas industry, and he was proud to have had the opportunity of serving such a department. He touched on the competition the gas industry had now to meet, and emphasized the necessity of continual "forging ahead." He expressed the hope that the Birmingham Gas Department would always be found in the van of progress. A vote of thanks to Mr. Barrett for presiding, proposed by Mr. Y. Dingley, the Assistant Secretary, and seconded by Mr. Wardell, terminated a most successful and enthusiastic gathering.

OBITUARY.

The death has lately occurred at his residence, at Whitley Bay, of Mr. Charles D. Main, one of the oldest officials of the Newcastle and Gateshead Water Company. For nearly forty years he had been in their service, and occupied the position of Registrar. A short time ago he had a paralytic seizure. The deceased, who was widely known and esteemed, took a prominent part in the public affairs of Whitley Bay. He was 55 years of age, and leaves a widow and one son.

The death occurred recently of Sir Joseph Thomas Firbank, the Deputy-Chairman of the Newport (Mon.) Gas Company. Sir Joseph had resided at Chislehurst for many years; but he died at Tunbridge Wells, where he was staying for the benefit of his health. The interment took place in St. Nicholas Churchyard, Chislehurst, last Tuesday, in the presence of a number of relatives and friends. Mr. T. H. Hazell (the Secretary) represented the Newport Gas Company, the Directors and staff of which sent one of the many beautiful floral tributes to the memory of the deceased.

The death has recently occurred, as the result of illness consequent upon a paralytic seizure rather more than two years ago, of Mr. William Mansfield Gardiner, a well-known and highly-esteemed Solicitor of Uxbridge, of which town he was a native. His father, Mr. William Gardiner, who was also a Solicitor, was the first Secretary of the Uxbridge Gas Company. On his death he was succeeded by his son, who had been acting jointly with him, and who held the position till two years ago. Together, they had been connected with the Company for fifty years. Deceased leaves a widow, one daughter, and two sons.

The death is recorded, at the age of 83, of Mr. Theodore Aston, K.C., who was one of the principal specialists at the Bar on the law of patents. About forty years ago, Mr. Aston was one of the chief competitors of Mr. Webster, Q.C. (father of the present Lord Chief Justice), who was almost the earliest member of the Bar to devote himself exclusively or mainly to this branch of work. He was called in 1853, and took silk in 1872. From that year he enjoyed a commanding practice in patent actions, among the most important of which was one brought by Mr. R. H. Patterson against the Gaslight and Coke Company for an alleged infringement of the patent in connection with his process for the purification of gas. He retired from active practice some years ago.

A sad incident attended a football match between Sunderland and Stockton boys in the English Schools Shield competition at the West End football ground, Sunderland, on the 22nd ult. During the progress of the match, one of the spectators—Mr. John Grant, of the Westlands, Sunderland—was seen to fall; and on medical aid being summoned, life was found to be extinct. Deceased, who was 65 years of age, was Outdoor Superintendent of the Sunderland Gas Company, whose service he entered in 1859, when a lad of fifteen. From the position of shop boy, he gradually rose to be meter inspector, meter repairer, superintendent of the Ayres Quay Gas-Works, and finally to the position he occupied at the time of his distressingly sudden death. His jubilee with the Company was celebrated last November, when he was the recipient of a present from his co-workers, as recorded in the "Journal." Ever of a genial and kindly disposition, he was held in great esteem both among his colleagues and the general public with whom his duties brought him into contact, and his sudden decease will be widely mourned. Mr. Grant, who was a widower, leaves a grown-up family of three daughters and a son. At the inquest, a medical man who had attended deceased said that he suffered from weak action of the heart, and that death was attributable to its failure accelerated by chill. A verdict was returned in accordance with this testimony.

Tanks with Bulging Sides.

It will be remembered that a translation of the important paper on "Gasholder Tanks with Bulging Sides," read by M. Bonnet at the last meeting of the Société Technique du Gaz, has already been given in the "Journal." We have since received a pamphlet of eight pages dealing with the mathematical aspects of this interesting and novel design of tank. First, a general formula is set out, applicable to all curved or bulging tank sides, and embodying the fundamental relationship existing between different strains per unit of surface. Then follows a more detailed consideration of this general formula, with a concluding paragraph relating to annular tanks. The system is known as the "M.A.N." system; and no doubt fuller information concerning it would be forthcoming from the Maschinenfabrik Augsburg Nürnberg.

Gas Culinary Installations in the United States.

The last number to hand of our American contemporary "Progressive Age" contains a feature which we believe to be absolutely unique in gas journalism. Out of 44 large pages (11 in. by 8 in. of reading matter), 24 of them are occupied with illustrated descriptions of installations of gas appliances in hotels, restaurants, and large establishments in the United States. The articles are led off by Mr. John M. Brock, who describes "Hotel Ranges in New York City," with the assistance of photographs and particulars supplied by Messrs. H. P. M'Lean and William De Frietas, of the Consolidated Gas Company. Then follows an article by Mr. G. E. Smith, the Gas Fuel Expert and Gas Appliance Superintendent for Hudson County for the Public Service Gas Company of New Jersey. Next comes a description of the gas-ranges in Baltimore, by Mr. H. K. Dodson, the Commercial Agent of the Gas Division of the Consolidated Gas, Electric Light, and Power Company of Baltimore. Mr. E. D. Brewer, who is responsible for the advertisements of the Atlanta Gas Company, has something to tell about the gas installations in that city; and Mr. Philmer Eves, the Sales Agent for the Indianapolis (Ind.) Gas Company, follows him on the subject of those in his district. The other places dealt with are Atlantic City (N.J.), by Mr. Clark R. Graves; Denver (Col.), by Mr. H. V. MacPherson; Portland (Ore.), by Mr. H. M. Papst; Philadelphia (Pa.), by Mr. T. R. Elcock, jun.; Milwaukee (Wis.), by Mr. F. P. Kelsey; Detroit (Mich.), by Mr. Alonzo P. Ewing; and Wausau (Wis.), by Mr. J. D. Taylor, jun. Following these articles is a description of the gas appliances at the new hospital in Munich, taken from the "Journal für Gasbeleuchtung;" and an article on the "Selection of Water-Heaters for Hotel or Restaurant Service," by Mr. G. P. Blakiston, Advertising Manager for the Pittsburg (Pa.) Water-Heater Company. The text of this interesting series of articles is accompanied by eighty illustrations.

Scottish Junior Gas Association (Western District).—The members of the Western District Division of the Scottish Junior Gas Association will meet in the Technical College, Glasgow, next Saturday evening, when a paper on "The Repair of Meters" will be read by Mr. George Scott, of Glasgow.

STRETFORD GAS COMPANY AND THEIR WORKS.

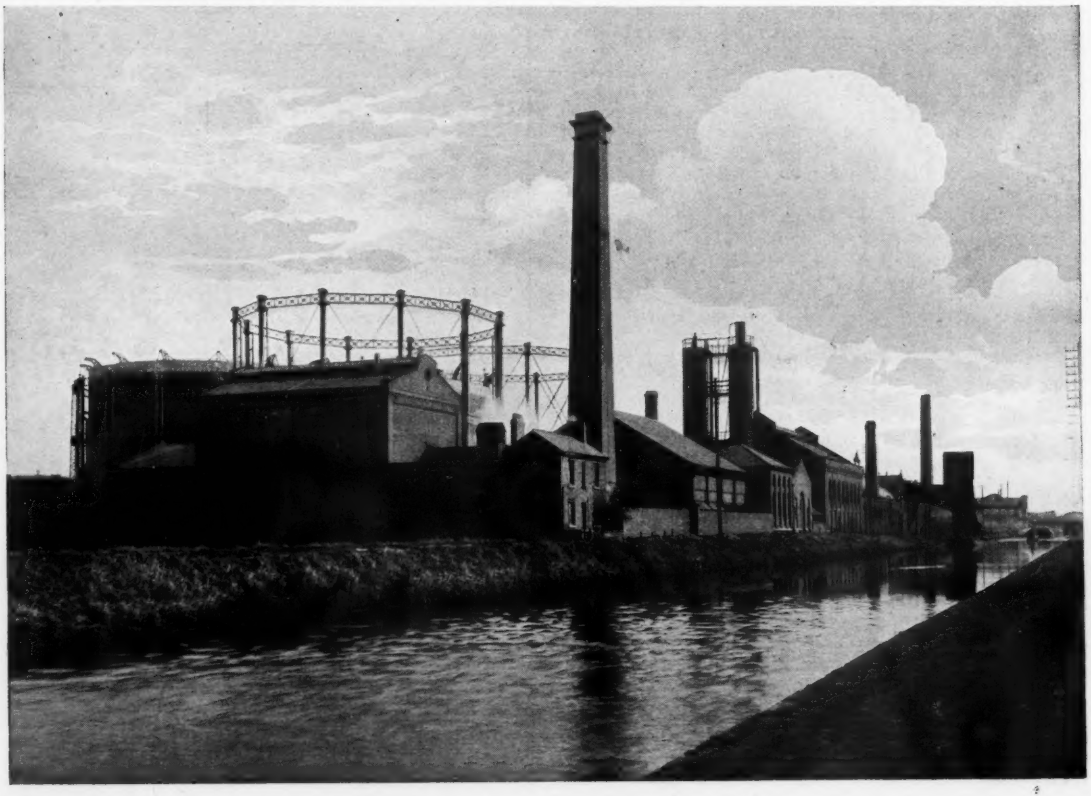
Visited last Saturday by the Manchester District Institution of Gas Engineers.

THE Stretford Gas-Works were established in 1854 by a number of residents in the district, after a public meeting had been held to consider the matter; and for many years the whole of the shares were held locally, largely by the consumers. With the efflux of time, however, they are now more generally distributed, though a large proportion are still held by residents in the district. In 1855 additional land was taken, and a new Company formed to extend the works; and in 1862 the first Act was obtained, conferring statutory powers on the Company, defining the area of supply as covering the districts of Stretford, Chorlton-cum-Hardy, Urmston, Lostock, Flixton, Davyhulme, and Croft's Bank in Lancashire, and Ashton-on-Mersey, Sale, and Timperley in Cheshire. The Company has never exercised any of its powers in Timperley; and in 1906 Chorlton-cum-Hardy was transferred to Manchester. The area now supplied exceeds 17 square miles, and has seven different centres of population. With the exception of the Trafford Park area, it is entirely residential, with a large proportion of good and middle-class houses.

In 1877 it was necessary to appeal again to Parliament, and further powers and land were secured. Again, in 1899, by a third Act, the authorized capital was extended, additional land secured, and several valuable powers conferred on the Company, including power to lay pipes in streets not dedicated to the public use, to supply and inspect gas-fittings, &c., to form an insurance fund, &c. These powers have been particularly valuable during the last few years.

The Company is a maximum-dividend one, with power to raise capital and pay interest as follows: 10 per cent. on £25,000, 7½ per cent. on £14,000, 7 per cent. on £61,000, and 5 per cent. on £160,000, with the usual powers of raising 20 per cent. in addition by loans or debenture bonds. The present paid-up capital is £163,118, of which £23,854 is unexpended. The actual amount spent on capital account is £189,263; but this has been reduced by £50,000, the sum paid by Manchester for the Chorlton area.

The output of gas from the works increased gradually at first, but it has grown more rapidly since the Cheshire Lines Railway was opened in 1875 and the land laid out for building purposes. The rate of increase has been checked by the establishment of four electrical undertakings within the area—viz., Stretford and Sale Urban District Councils, Trafford Park Supply Company, and the Altrincham Electrical Supply Corporation. The number of consumers who have wholly, or nearly so, gone over to electricity is comparatively small; but the Company are obtaining less of



General View of the Stretford Gas-Works from the Canal Towing-Path.

the better-class new property than they would if they had a freer hand. The make of gas increased from 55,254,000 cubic feet in 1876 to 238,219,000 cubic feet in 1900, and to 365,971,000 cubic feet last year. The Company have adopted many means of increasing the consumption—hiring cookers and loaning grillers; free cleaning of gas-fires, cookers, and grillers; maintenance of incandescent burners; holding periodical exhibitions of all appliances; opening show-rooms, and prompt attention to all complaints by an efficient home-trained body of gas-fitters who are instructed to give every assistance and advice to the consumers. In 1890 there were no cookers, grillers, or prepayment meters, and only 3743 ordinary ones, in use; whereas now there are in operation 1463 cookers, 5128 grillers, 8788 ordinary meters, and 2970 prepayment meters. As a consequence, the consumption of gas in the daytime has increased at a greater rate than in the evening, as shown by the following figures giving the daily consumption in thousands of cubic feet:—

	Summer.		Winter.	
Year.	6 a.m. to 6 p.m.	6 p.m. to 6 a.m.	6 a.m. to 6 p.m.	6 p.m. to 6 a.m.
1890	32	148	168	421
1909	369	375	730	966

POSITION AND EXTENT OF THE WORKS.

The works are situated on the banks of the Bridgewater Canal (now the property of the Manchester Ship Canal Company), about midway between the Manchester South Junction and Altrincham Railway and the Cheshire Lines Committee Railway—divided from the former by the main Chester Road; and they are without any railway sidings. Nearly all the coal received at the works is brought by water from the Wigan district, which is the natural source of the Company's supply. The works have been altered, extended, and partially rebuilt from time to time, originally with little regard to future extensions being on the most economical lines. Some of the buildings—notably the coal-stores and the range of buildings containing the engine, boiler, and pump-houses—are part of the original works erected in 1862, and now used for different purposes from those originally intended.

RETORT-HOUSE.

The retort-house plant is capable of producing 2¼ million cubic feet per day, and contains two stacks each of eight through settings of 22 inch by 16 inch retorts, 20 feet long, built over regenerator furnaces, and fitted with self-sealing mouthpieces and hydraulic mains on both sides of the settings, with 6-inch diameter ascension, bridge, and dip pipes. The hydraulic mains are provided with Dillamore tar-columns, and all are fitted with Meunier's patent hydraulic main floats. Each stack is provided with a 12-inch Braddock retort-house governor.

The retorts are charged by means of West's manual stoking machinery, fitted with their latest form of manual charger, and supplied with coal from two overhead hoppers (one on either side

of the retort-stack), each capable of holding 20 tons of broken coal. The coal-breakers are in duplicate, and are of a specially strong type for breaking-down cannel. They are driven by 12-H.P. vertical steam-engines. The breakers are fitted with clutch gearing, so that they may be thrown out of action when slack is being carbonized; and each is provided with two sliding doors—one to regulate the supply of coal to the breaker, and the other directly supplying the elevator. The latter, which with the breakers are placed on opposite sides of the retort-house, are of the usual bucket type, capable of elevating 15 tons each per hour, and are connected at the top in the retort-house roof by an 18-inch reversible band conveyor, so that both storage hoppers can be filled from one elevator if necessary. The adoption of power machinery and coke plant is under consideration.

The main coal-stores are between the retort-house and the canal wharf, with a subsidiary store on the north side of the former. The main store is served by coal-handling machinery, while in the latter is stored the coal received by rail, which is carted from the Stretford Railway Station nearly a mile away. The two stores will hold 4000 tons of coal.

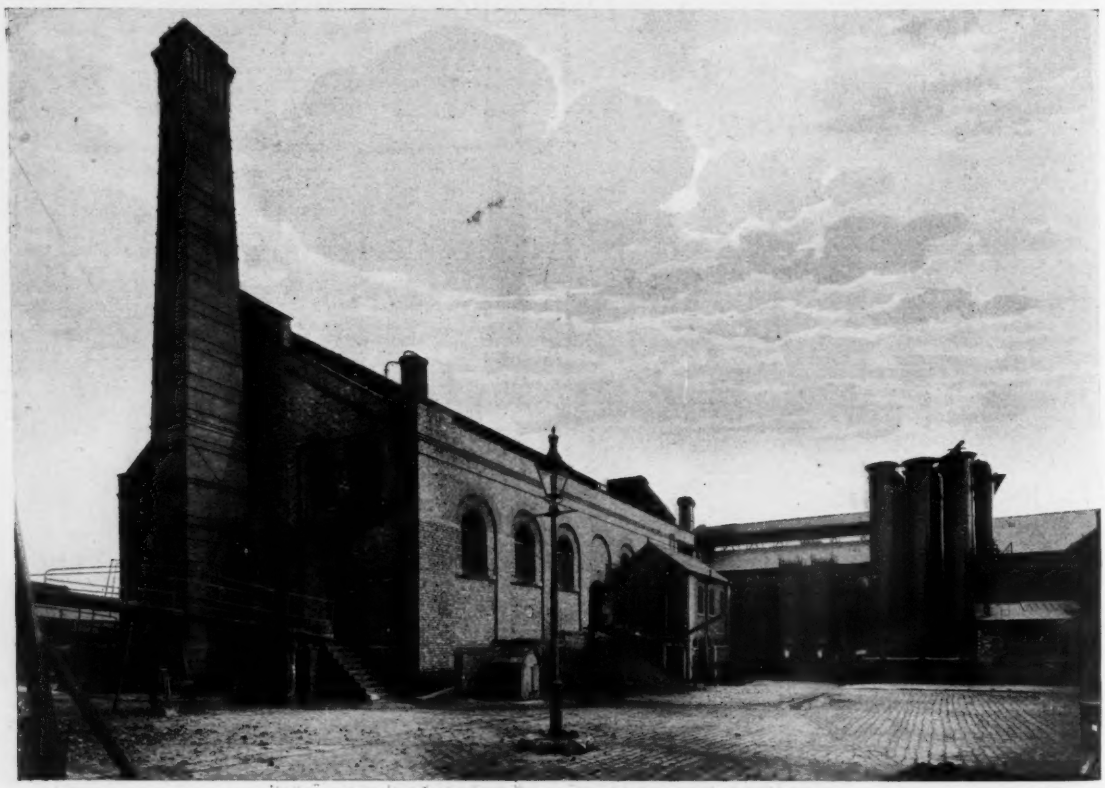
Coal-Handling Machinery.

This consists of an elevator and conveyors for discharging boats, and either storing the coal in the sheds or feeding the coal-breakers and retort-house hoppers. The elevator is a movable one, capable of being lowered into the boats, and consists of a trunk, 48 feet long, 2 ft. 3 in. wide, and 4 feet deep, fixed at the centre to radial arms which are in turn attached by heavy trunnions to the framework. The elevator is counterbalanced by weights slung from wire ropes, and is raised or lowered by means of a friction hoist and wire ropes working over heavy blocks. The framework is built of steel joists and substantially braced.

The elevator chains are double, 12-inch pitch, working over hexagonal drums, with tightening screws at the foot. The buckets are of large size, 24 in. by 12 in. by 12 in., originally built for dealing with large coal, and capable of elevating 20 tons per hour. The coal is fed into the boot by hand, three men working together, and it is delivered on to the main 24-inch steel plate conveyor, 102 feet long, which is provided with throw-off ploughs to allow the coal-store to be filled up all along its length. At the delivery end a small hopper and shoot are provided, so that coal can be shot direct into the coal-breaker. A cross conveyor of the same size as the main conveyor is fixed at the canal end of the coal-store, and feeds a secondary conveyor, 80 feet long, in the adjoining store. The framework of the conveyors is constructed entirely of steel angles and flat bars, and carries sets of rollers on the top and bottom members to ease the friction and carry the weight of the conveyor plates. The conveyors stack the coal 20 feet high, and very little has to be trimmed after being deposited in the stores. A 40 B.H.P. gas-engine, working on a line shaft, drives the plant. The cross and secondary conveyors can be thrown out of action by a clutch on the main line shaft.

Condensing Plant.

This plant consists of an 18-inch cooling main along the south side of the retort-house and round the main coal-store, connecting



The Works' Interior.

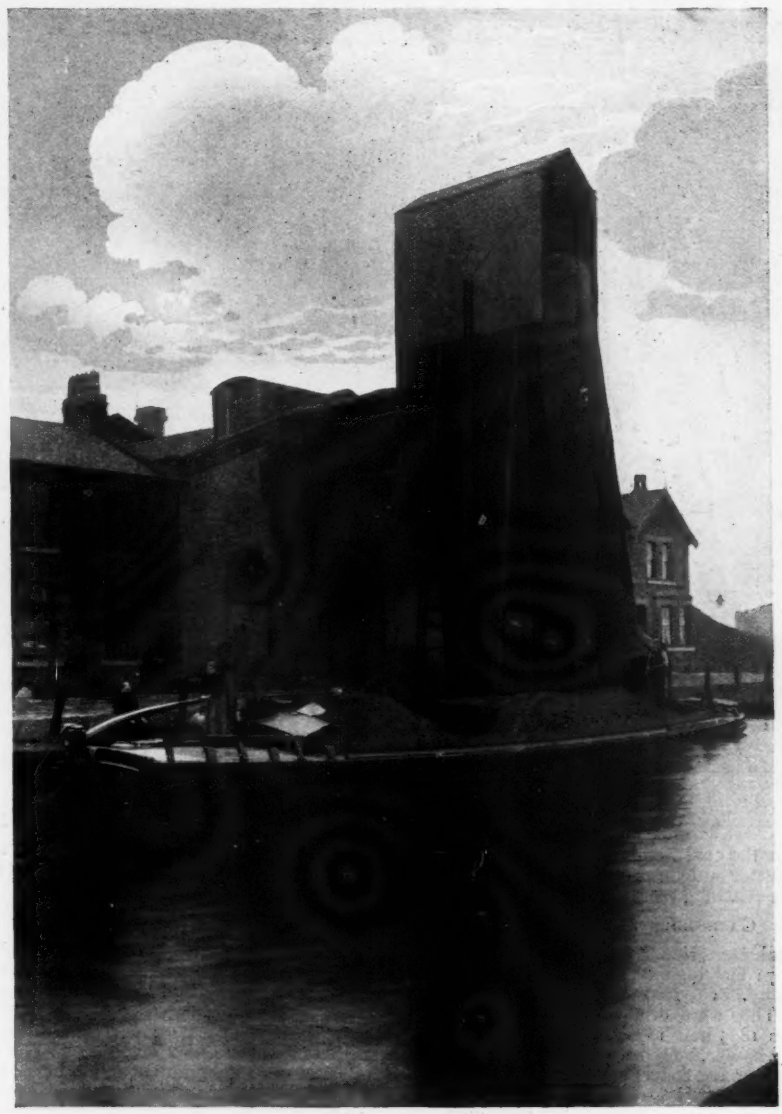
up both the retort-stacks to the coolers. The latter consist of a battery of nine annular towers, 32 feet high and 4 feet outside and 3 ft. 3 in. inside diameter, provided with butterfly valves and water-sprinklers. The battery is arranged in three series of three columns, each capable of being worked separately. The connections are so arranged that the gas is always travelling down the columns. The water coolers consist of four Clapham towers, 20 feet high by 3 ft. 4 in. by 3 ft. 4 in., each containing 81 water-tubes. The gas in these also travels downwards and the water upwards. The connections are arranged so that the gas can travel through the towers in one or two streams as desired.

Exhausters and Boilers.

There are two four-blade and one three-blade Waller exhausters of 60,000 and 45,000 cubic feet per hour capacity respectively, governed by Donkin steam gas regulators driven by steam-engines—two Lancashire boilers, 28 feet by 7 feet diameter, fitted with Galloway tubes in the flues, fired by Wilton's forced-draught furnaces, fed by water heated by the exhaust steam from the exhauster engines.

Washer, Scrubbers, and Purifiers.

There is a Livesey washer, of 2 million cubic feet capacity per day, fed by weak liquor from No. 2 scrubber. There are two tower scrubbers, 72 feet high and 11 feet diameter, fitted with boards, one fed with weak liquor pumped from the well and the other with town's water regulated from an overhead tank. The distributor of the latter is worked by a small engine at the base of the former. The purifiers are eight in number, 20 feet square and 5 feet deep, of the old water-lute pattern, elevated on a stage, provided with discharging shoots, and worked by two centre-valves. They are all fitted with Spencer's hurdle grids. The spent material from the boxes is revivified on the floor under the purifiers, and lifted to refill them by two elevators, one serving six and the other two purifiers. A disintegrator has been provided for better preparing the oxide for use; but it has only just been installed. It consists of a quadruple cage of square iron bars fitted to plates in pairs, each pair revolving in opposite directions at 500 to 600 revolutions per minute. The material is fed into the centre of the machine, and driven by centrifugal force to the outside. In passing through the revolving bars, it is broken up into the consistency of coarse or fine sand according to the speed of the machine; the object being to break up the lumps in the partly-spent material, which nearly always contain a core of oxide which has not been sulphided, making it more active and of uniform size. It is expected to more than regain the cost of preparation by the saving in the cost of emptying and refilling the purifiers and turning the material when on the revivifying floor. A 20-B.H.P. gas-engine drives both the disintegrator and oxide elevators.



The Coal Elevator at the Canal Side.

Pumps and Tar, Liquor, and Water Wells.

The pumps consist of one Cameron for the scrubbers, another for the works water supply (which is wholly pumped from surface wells), one horizontal double-acting tar and liquor pump, and a battery of three pumps employed as stand-bys to the first. The tar, liquor, and water wells were originally gasholder tanks, which have been covered over and lined inside with 4½-inch brickwork in cement. The tar and liquor well is 50 feet diameter and 18 feet deep; the water well is 60 feet diameter and 18 feet deep. All the surplus water from the coolers and retort-house supply, as well as the rain water, is stored in the latter, and drawn upon only when it is full, and when the surface-well suction-pipes are receiving attention.

Naphthalene Removal.

There is a steam-heated vaporizer into which shale naphtha is run by gravity; the quantity being regulated by a micrometer cock and sight-glass. Part of the gas made passes through the body of the vaporizer, sweeps out the naphtha vapour, and carries it forward into the holders. Traces of naphthalene are found in the district at a distance of more than three miles from the works.

Carburetted Water-Gas Plant.

This consists of one complete set of gas-making plant by the Economical Gas Apparatus Construction Company, Limited, capable of producing 500,000 cubic feet of gas per day, complete with the usual producer, superheater, fixing chamber, and washbox. The oil is fed into the gasifying chamber through two injectors at a pressure of 80 lbs. per square inch. The heats of the fixer are kept at a predetermined temperature by observations on a Crompton nickel-steel pyrometer; and a check is kept on the working by means of a Thorp cycle recorder. No special instrument is used to ascertain the amount of carbonic acid present; but by means of the Orsat apparatus the blast pressure is arranged to give a crude gas containing 2¾ to 3 per cent. of carbonic acid, which is found to be the most economical working.

The condenser, 18 ft. high by 5 ft. 6 in. diameter, is of the usual water-tube type; the scrubber being of the same size, and fitted with boards. The exhausters are of Waller's make, with four blades, each capable of passing 50,000 cubic feet per hour.

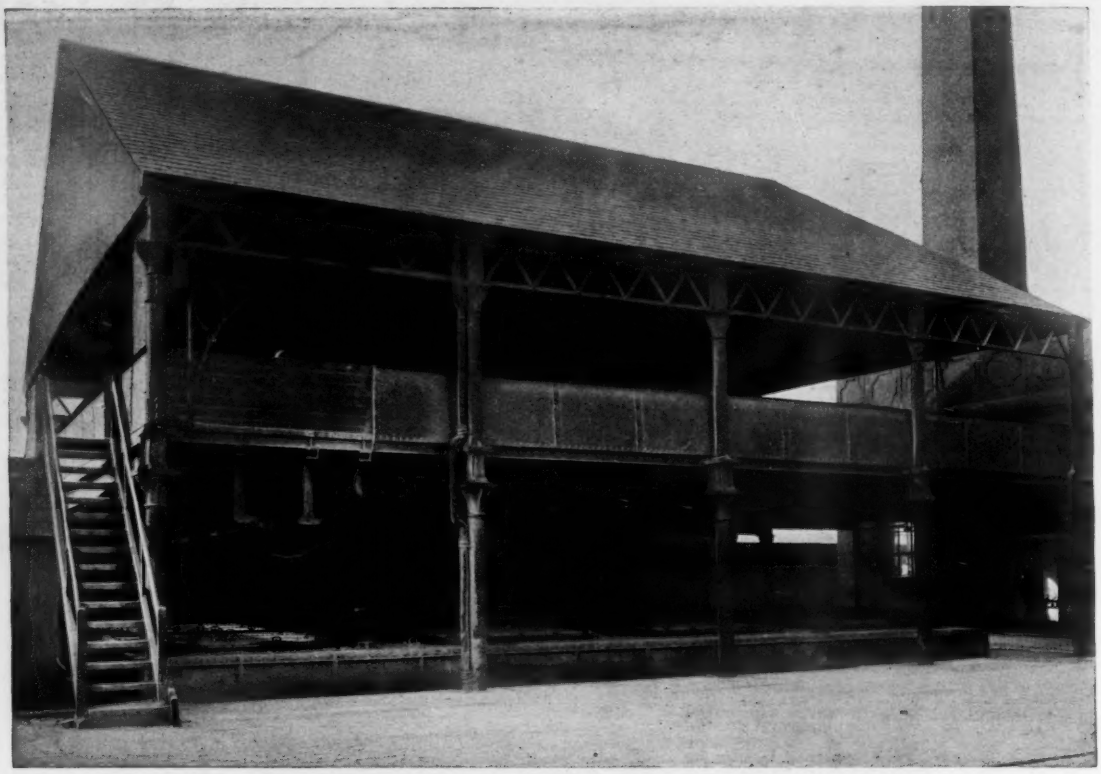
The buildings are arranged so that two more sets can be installed when necessary; and the auxiliary plant is all capable of dealing with a million cubic feet of gas per day.

The boilers are in duplicate, of Lancashire type, 24 ft. long by 6 ft. 6 in diameter, provided with one of Green's economizers of 128 tubes. A steam feed-water heater is also installed; the water entering the boilers at a temperature of 180° Fahr. The Sturtevant blowers are in duplicate, and are driven from a countershaft by 16 H.P. Tangye horizontal engines; each blower being large enough to supply blast to two plants. The pumps, of the Blake-Knowles pattern, are all in duplicate, except those for the cooler and oil-tank service; a large overhead water-tank, always kept full, being intended to supply the cooler and the boilers, should there be any failure of the well. The coolers are supplied from the gasholder tanks; the water being returned to them from the cooler overflow.

The separator consists of a steel tank, 22 feet long by 10 ft. 6 in. by 2 ft. 6 in. sunk into the ground, divided into sections by division-plates which do not reach the bottom. The mixed tar and water enter at one end, while the separated products overflow at the opposite end into separate brick tanks, the water being pumped over the seal-box and scrubber again and again, and the tar into an overhead tank, where it again settles out, and is finally run into the main tar-well and mixed with the coal-gas tar.

The relief holder is single-lift, 50 feet diameter and 20 feet deep, prepared for telescoping, in a brick and puddle tank. The inlet and outlet are on opposite sides, to allow of a thorough mixing of the gases. The oil-storage tank is of 400 tons capacity; the o being pumped into it from an underground receiving-tank. Al oil is delivered to the works by road tank-waggons.

The four purifiers are 30 feet square by 5 ft. 6 in. deep, built in two pairs, fitted with Green's luteless lids, and worked by four four-way valves. Three of the purifiers are filled with lime, and the fourth with oxide as a catch. They were built by Messrs. Newton, Chambers, and Co., Limited. The station meter is of 30,000 cubic feet per hour capacity—built by Messrs. Cowan.



The Purifier House and Revivifying Floor.

The streams of gas from the coal-gas and carburetted water-gas plants are joined at the meter outlets, and consequently are always thoroughly mixed before reaching the gasholders.

Gasholders.

There are three gasholders. Nos. 1 and 2 are three-lift, each 100 feet diameter and 72 feet high when fully extended, and of 540,000 cubic feet capacity. The tanks are of brick and puddle, with very low cones. They were originally two-lift holders; a third lift being added in 1895 and 1896 respectively by the late Daniel Howard. No. 3 holder, built in 1901 and 1902, has four lifts, and is 130 feet diameter and 80 feet high when fully extended. It is of 1,100,000 cubic feet capacity. The inner lift rises clear of the guide-framing. The crown is not trussed, but rests on a timber framework when down. The tank was constructed by Messrs. E. Nuttall and Co.; the holder being built by Messrs. Clayton, Son, and Co., Limited.

Station Meter and Governors.

There is one station meter, of 60,000 cubic feet per hour capacity, constructed by the Gas-Meter Company, Limited. A 15-inch old-type Braddock governor is now used as a safety governor. The district governors are water-loaded, and are three in number —viz., an old-pattern Parkinson, 18 inches diameter, supplying Stretford, Old Trafford, and Trafford Park; a Braddock double-beat governor, 21-inch size, supplying Sale and Ashton-on-Mersey; and a similar governor, 18-inch size, supplying Urmston, Flixton, Davyhulme, and the Westinghouse works.

Carburettors and Coal-Testing Plant.

Two carburettors are in use for enriching by benzol if necessary. They are of the Norwich type, the same as the naphthalene carburettor. A complete coal-testing plant—with retorts, coolers, purifiers, and gasholder—is capable of carbonizing 1-cwt. charges.

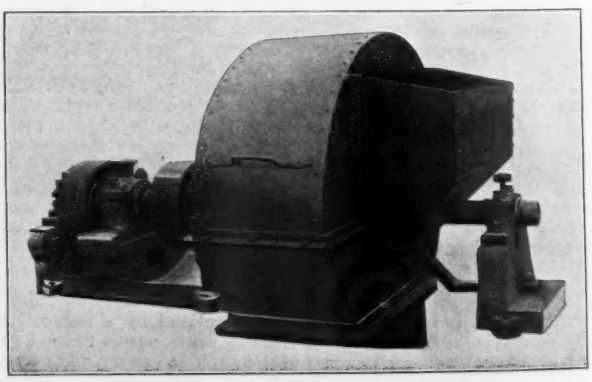
Stores, Workshops, and Offices.

The works are not provided with modern stores; but they have plenty of storage room. The brass and fitting stores are situated over the engine-room; and the timber and barrow stores are behind the scrubbers. The meter, cooker, bolt, tube, oil, and paint stores, as well as the stove-repairing shops, are situated in a building originally erected as a cannel-store. The fitting shop is small, but is fitted with engine, lathe, drilling-machine, and other tools. The blacksmith's shop is complete with a forge and shearing-machine and an iron-store adjoining. There are no joiners' or meter shops; all this work being given out.

The offices have just been improved and slightly extended, and are now large enough for the present wants of the Company; the most crowded being the laboratory. New and larger offices on a better site are under consideration. There are a branch office, show-room, and stores at Sale, and others are in contemplation at Urmston and Stretford.

In the portion of the above description dealing with the washing and scrubbing plant, reference is made to a "disintegrator," of which a few particulars are given. It was supplied by Messrs. Crone and Taylor, of Sutton Oak, St. Helens; and it is shown in the accompanying illustration.

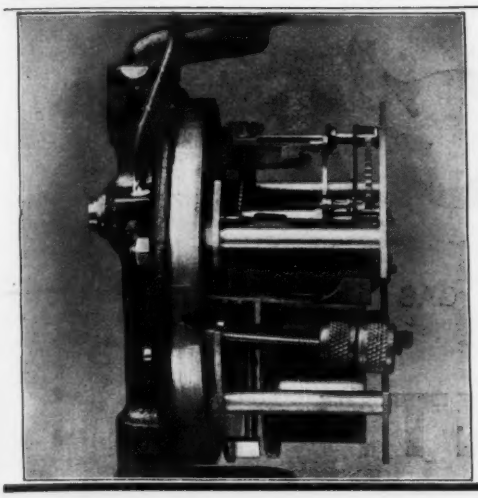
The above-named firm have had many years' experience in the production of these machines, andhave made improvements in them, so that each is now specially designed for the work it has to do. They are constructed with two, three, or four rows of square, round, or rectangular bars. The one supplied for the Stretford Gas-Works is an improved type having special clearances and bars suitably spaced for dealing with oxide of iron. There are four rings of bars, two revolving in one direction and two in an opposite one; the grinding action being by percussion and centrifugal force. The material is fed into the centre of the machine by means of the feed hopper, and is delivered out in a spray fashion at the periphery, through the bottom side of the casing. It is of a very even grist, and of an open grain consistency; and there is



Crone and Taylor's Disintegrator.

no question as to the machine assisting revivification, the material dealt with being of a more absorbent nature. One of the chief advantages claimed for the disintegrator is that there is no tendency for it to clog or block up; and we understand that it will deal with oxide in almost any condition. Owing to its construction, there is a full current of air through it. These machines can be arranged to be driven electrically direct from a motor; the minimum of power being required, owing to the design of the discs, to their working independently of each other, and to the distribution of the bearings, which are of gun metal and large.

Mr. Harold Porritt, J.P., Chairman of the St. Anne's-on-the-Sea Gas Company, whose death was announced in the "Journal" for the 9th of August last, left estate of the gross value of £87,567, with net personalty amounting to £78,764.



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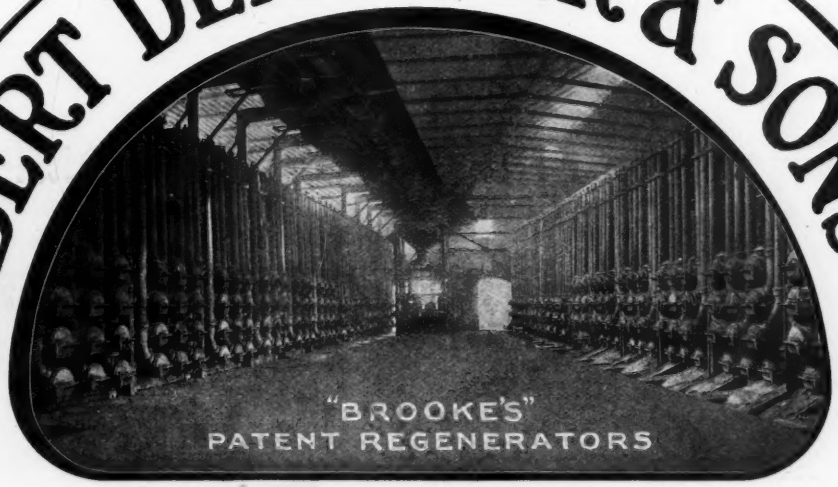

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MIDLAND ASSOCIATION OF GAS MANAGERS.

Meeting in Birmingham.

The Autumn Meeting of the Association was held last Thursday, at the Grand Hotel, Birmingham—Mr. VINCENT HUGHES (Smethwick), the President, occupying the chair. The attendance of the members was about a normal one. Among the visitors were Mr. R. S. Hilton, the Secretary and Manager of the Birmingham Corporation Gas Department, Dr. Rudolf Lessing, and Dr. Davidson.

The HON. SECRETARY (Mr. Harold E. Copp, of West Bromwich) read the minutes of the last annual and the summer meetings; and they were confirmed.

ACKNOWLEDGMENT BY MRS. COLSON.

The HON. SECRETARY reported the receipt of the following acknowledgment from Mrs. Colson, of Leicester, of the message of condolence from the Association on the death of her husband:

June 26, 1910.

Gentlemen,—I am deeply touched by the very kind and sympathetic resolution passed at your last meeting concerning the death of my dear husband.

I should have replied earlier; but, as you are aware, at these times many things have to be done in a limited period, and little time is left for writing even if one had the courage.

It is, indeed, a terribly heavy blow which has fallen on us. We have not only lost the head and mainstay of the home, but the dearest and best husband and father. My family and myself beg to convey our very grateful thanks for your kind and appreciative mention of him, and your expression of sincere sympathy to ourselves in our great sorrow. A few days before his death, he desired his love to all his friends; and, I am sure, I am doing what he would have wished by sending his message to you all. This I do, and deliver it as coming direct from himself to you, with whom he was associated for many years.

Again assuring you that we value your expression of sympathy and regret very fully—I am, faithfully yours, MARGARETTA COLSON.

SCRUTINEERS.

On the motion of the PRESIDENT, seconded by Mr. W. LANGFORD (Longton), Mr. Charles Meiklejohn (Rugby) and Mr. S. O. Stephenson (Tipton) were appointed Scrutineers of the ballot-papers.

NEW MEMBER.

On the motion of the PRESIDENT, seconded by Mr. SAMUEL GLOVER (St. Helens), Mr. F. T. Callant, of Bedworth, near Nuneaton, was elected a member of the Association.

DEATH OF MR. G. B. SMEDLEY.

The PRESIDENT said he had next to report the death of Mr. G. B. Smedley, who had been very regular in his attendance at their meetings, and also at those of the Manchester Institution. Mr. Smedley was a great sufferer for the last year or two of his life. He proposed that a letter of condolence be sent to the representatives of his family.

Mr. HUBERT POOLEY (Stafford) seconded the motion, which was unanimously carried.

TWO DESERVING CASES FOR MATERIAL SYMPATHY.

The HON. SECRETARY said, as the President had remarked, that Mr. Smedley the last two or three years of his life suffered from a painful and serious illness, naturally, the expenses had been very heavy; and the result of it was that Mrs. Smedley had not been left in very happy circumstances. Upon the instructions of the Committee, he had written to Mr. Dunn, the Hon. Secretary of the Gas Institution Benevolent Fund. He found, however, that a movement had already been made in other directions for Mrs. Smedley by members of the Manchester Institution. Mr. Dunn replied that the matter would receive the attention of the Committee of the Benevolent Fund. But he also emphasized the fact to which the President (Mr. James W. Helps) referred at the last annual meeting—the fact that the funds were at present at a somewhat low ebb; and it was a question as to how far they could go in relieving a case of necessity of this kind. He (Mr. Copp) had also received a letter from Mrs. Darwin. This he read; and it showed a very sad case. This matter he had also placed before Mr. Dunn, and had received practically the same reply as to the former letter. He also asked him (Mr. Copp) to appeal to the members to see whether something more could not be done in aid of the fund. In a conversation with Mr. Meiklejohn, he had reminded him that the Midland Association had done very well for the fund; and the only way he (Mr. Copp) thought they ought to do more was by an increased number of subscribers from their members. About 60 out of the 112 were subscribers.

The PRESIDENT thought the proportion was a good one, and would compare favourably with other Associations. The Association had also voted sums from their surplus money for the Benevolent Fund. But after such letters as they had received, he would ask those gentlemen who were not subscribers to the Benevolent Fund to become so.

ALTERATION OF RULES.

This matter, which was fully discussed at the Spring Meeting, was again brought forward for final disposal.

The HON. SECRETARY introduced the subject, and said he did not agree with Rule 1, which provided for the formation of a class of associate members. He could not see there was any justification for a second class of membership; and he thought it quite sufficient to be in the position to elect "persons who, by reason of their professional knowledge or experience, are, in the opinion of the Committee, qualified to assist in promoting the objects of the Association, and who shall not be engaged in trade." Such gentlemen could be admitted as full members, and not as associate members at all. The deletion of the words: "And associate members shall be" would also meet the views of the Junior Association, who were exceedingly nervous that the Senior Association might trespass on their ground.

There was general support given to Mr. Copp's views by Mr. W. S. MORLAND, Mr. F. J. BYWATER, Mr. J. FERGUSON BELL, Mr. B. W. SMITH, and Mr. W. LANGFORD.

On the proposition of Mr. BYWATER, seconded by Mr. BELL, it was agreed to omit the words as to associate members; and thereafter the rules were passed—those that have undergone revision being the following (in their amended form):

That the Association be called "The Midland Association of Gas Engineers and Managers."

The object for which the Association is established is to promote the advancement of the gas industry in all or any of its branches.

RULE 1.—That this Association shall consist of (1) members and associates. Members must be engineers or managers of gas undertakings, or superintendents of gas-works making 500 millions or more per annum; and persons who, by reason of their professional knowledge or experience, are, in the opinion of the Committee, qualified to assist in promoting the objects of the Association, and who shall not be engaged in trade; and (2) honorary members, who, though formerly qualified as members, have retired from active management, to be elected at the discretion of the Committee. All members to have equal voting power.

RULE 2.—That the management of the affairs of the Association shall be confided to a Committee, which shall consist of a President, Vice-President, four immediate Past-Presidents, Hon. Treasurer, Hon. Secretary, and nine members, any four of the foregoing to form a quorum. The President and Honorary Secretary, for the time being, of the Midland Junior Gas Engineering Association to be *ex-officio* members of the Committee.

RULE 4.—Three elected members of the Committee and one of the Past-Presidents shall retire annually in rotation, and shall be ineligible for re-election during the following year. Nominations of office-bearers and members of Committee shall be made by two members (with the consent of the person nominated), and sent to the Hon. Secretary by the 30th of September in each year. That at least seven days prior to the autumn general meeting, a list of the members so nominated be posted to each member, together with printed envelope for reply, which must be returned to the Hon. Secretary within four days, or by the date named on the list. The ballot-papers to be opened by two scrutineers appointed at the autumn general meeting, and the result announced.

RULE 9.—All questions, except those of a personal nature, to be decided by any convenient system of open voting; the Chairman to have a second or casting vote when necessary. Questions of a personal nature to be decided by ballot.

RULE 13.—The annual subscription to be paid by each member shall be 10s. 6d., payable in advance on the 1st of January each year.

ELECTION OF OFFICE-BEARERS.

The PRESIDENT said the Scrutineers reported that the gentlemen elected as officers for next year were as follows:

President: Mr. J. H. Brown, of Nottingham.
Vice-President: Mr. A. Cooke, of Oldbury.
Hon. Treasurer: Alderman W. R. Cooper, of Banbury.
Hon. Secretary: Mr. Harold E. Copp, of West Bromwich.
Members of Committee: Mr. W. A. Sapey, of Tamworth, Mr. W. J. R. Baker, of Great Malvern, Mr. W. G. S. Cranmer, of Willenhall, Mr. W. W. Townsend, of Hereford, Mr. J. M'Coll,* of Halesowen.

[* See succeeding remarks of President.]

Auditors: Mr. W. H. Adams, of Bilston, and J. R. Duff, of Banbury.

Proceeding, the President said he must congratulate Mr. Cooke on the honour conferred upon him. The new rules provided for five members of the Committee, so that the two gentlemen who would not otherwise have been elected were now members of the Committee. They were short of one name to make up the five; and so it had been suggested that Mr. M'Coll should be elected. He proposed his election.

Mr. A. T. HARRIS (Market Harborough) seconded the motion, which was unanimously carried.

Mr. BROWN thanked the members for the great honour conferred upon him in electing him President of the Association for the ensuing year. He could assure the members that he should do all in his power to maintain the honour and the success of the Association.

Mr. COOKE also expressed his sincere thanks to the members for having elected him to the office of Vice-President. He should

be very pleased to do what he could for the advancement of the Association.

THE HON. TREASURER.

Mr. J. FERGUSON BELL (Derby) said he thought he should be expressing the feelings of the members in saying how pleased they were to see Mr. Alderman Cooper at the meeting that day. He had been ill for some months; and at the last meeting, it would be remembered, they had passed a vote of condolence with him. They were indeed all delighted to see him; and hoped they would be able to welcome him for many years in the capacity of their esteemed Hon. Treasurer.

Alderman W. R. COOPER (Banbury) thanked the members very sincerely for their renewed confidence in him as their Treasurer. He also desired to take this, the earliest opportunity he had had, of thanking them all for the great kindness shown to him during his illness. The receipt of the letter of sympathy at that time afforded him much pleasure; and though unable to be with them on what he might term their annual holiday, when they visited the town of their President, he was with them in spirit.

BYE-PRODUCTS COKE-OVENS AND UTILIZING THE SURPLUS GAS FOR LIGHTING.

A paper (illustrated by lantern slides) was then read on this subject by Mr. J. S. LUCKING, of Clay Cross; and the discussion was taken in conjunction with that on the paper on

CARBONIZING SYSTEMS AND RESULTS,

read by Mr. Alfred T. Harris, of Market Harborough, at the Spring Meeting. A communication on the subject was read from Mr. Thomas Glover; and Mr. Samuel Glover and Mr. J. Ferguson Bell also made substantial contributions to the discussion. Several other members and visitors generally discussed the subject; and it was, in consequence, a long sitting that was indulged in. A report appears elsewhere (see pp. 326-32).

This concluded the business before the meeting; and in the evening the members dined together.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Autumn Meeting at Stretford and Manchester.

The One Hundred and Fifty-Ninth General Meeting of the Institution was held on Saturday. In the early part of the day, the members met at Stretford for an inspection of the works of the Stretford Gas Company, of which Mr. H. Kendrick, the President of the Institution, is Engineer and Manager. There were about a hundred present at the gathering.

WELCOME BY THE GAS COMPANY.

Before a tour of the works was commenced, Mr. LEWIS GALLOWAY, the Chairman of the Gas Company, in welcoming the members, expressed the hope that in the course of their inspection of the plant at the works they would see something which would be of interest to them.

Mr. S. GLOVER (St. Helens) expressed the thanks of the members for the hearty welcome that had been extended to them by the Chairman and Directors of the Stretford Gas Company, and for enabling them to inspect their works. Much of the success of the Manchester District Institution of Gas Engineers was due to the facilities which were afforded the members of going over different gas-works; and he was perfectly assured that in their visit to Stretford they would find something that would be of interest, and do them good in the work they had to carry out.

[For a description of the works, see pp. 315-18.]

THE LUNCHEON.

At the conclusion of an inspection of the works, the party proceeded by train to Manchester, and were entertained at luncheon at the Grand Hotel by the Chairman and Directors of the Stretford Gas Company. Mr. Lewis Galloway presided, and was supported by Mr. William A. Nicholls, the Deputy-Chairman of the Gas Company; Messrs. Thomas Lund and Edwin Hibbert, Directors; Mr. William Blundell, Secretary; Mr. Alex. Wilson, of Glasgow, President of the Institution of Gas Engineers; Mr. H. Kendrick, President of the Manchester District Institution; and others. A short toast list was gone through.

The toast of "His Majesty the King" having been submitted from the chair and honoured,

Mr. W. A. NICHOLLS proposed "The Manchester District Institution of Gas Engineers." He said that on a former occasion they took the opportunity of expressing their pleasure that the Association should elect Mr. Kendrick to be President. He (Mr. Nicholls) had not the advantage of being present at that meeting, or he should have been happy to have associated himself with the resolution. He did so now. The Directors of the Stretford Gas Company had had for a long time a very high appreciation of Mr. Kendrick; and it was a source of much gratification to them to know that his brother engineers had endorsed this opinion by electing him President. Since that time, the opportunity presented itself (and the Directors were glad to avail themselves of it) of making Mr. Kendrick Manager as well as Engineer to the Stretford Gas Company. This was the position he held at the present moment; and it was the earnest hope of the Directors of the Company that the relationship between them and Mr. Kendrick would continue for a very long period, and that Mr. Kendrick would be blessed with good health and great happiness. Turning to the toast he had to propose, he considered it a real privilege to have been entrusted with it. At the same time, he had a feeling of a considerable drawback to this pleasure. He could not forget what he was himself, and that among those present were the very captains of the gas industry of the world. They were the capable captains—the thrice-equipped captains—of a great industry. In the first place, they seemed to have a natural aptitude for the business, taking to it as a duck took to water; then they had skill and learning in the theories of the gas business; and they were in addition trained and practical experts. To such an audience, what could he possibly say? He had only touched the outside fringe of the gas business; and it would be presumptuous on his part to say anything about gas problems to them. But he was glad of the opportunity given him of saying how much he appreciated the Manchester District Institution of Gas Engineers. He admired its objects, and fully appreciated its scope and its aims; and he also very much admired its activities and its proved usefulness. A great deal could be said about the activities of the Institution, even by people outside its ranks, such as himself. By it, they were able to associate together. They were able to rub shoulders with one another, compare notes, and tell each other of the difficulties and troubles they had had to contend with, and of the victories achieved. They could not possibly be members of such an Association without feeling that, however much they had learnt, they had still to go on learning. In the gas industry, there was no such word as finality. Almost every day one found something new. Gas engineers to-day were not content to simply mark-time. They were not content just simply to supply the quantity of gas that was required from time to time. They were men of progress, and ever aiming at improvements to bring them nearer and nearer to perfection. Gas engineers were always making experiments, finding out a new way to do this or that, making improvements in machinery and plant. The result of all this was that some discovery was made which put the industry a step higher. When such a discovery occurred, it was brought before the Association, and by this means everybody benefited. He would like to say in this connection that, though they might have the monopoly of supplying gas in their particular areas, they had not the monopoly of the supply of illumination. Gas undertakings had keen and fierce competition to face; and in some cases it was unfair competition. This being so, there was all the more need for Associations such as this, at the meetings of which they could discuss new discoveries, not only in connection with the manufacture of gas, but in relation to how best to increase its distribution—the natural result being of great advantage to the gas industry and greater advantage to the gas consuming population. As he had said, he had only touched the merest fringe of the gas industry; but it was a good many years since he did touch the fringe—that was when he became a member of the Gas Committee of the Manchester Corporation. He referred to this because he had some memories which might not be altogether uninteresting. He remembered one gentleman coming to him in those days—it would be about 1887—and saying, "The days of gas lighting are numbered." Another said the gas industry was doomed. And yet another declared that "the glorious sun of electricity has appeared upon the horizon, before which the mere moon-like gas will be turned into nothing." A good many things had happened since then; and the prophets of that day had been proved to be false prophets. He did not deny that electricity had made great strides since then, and was much cheaper now than was hoped for in those days, by reason of improvements in machinery and appliances. But if electricity had been much reduced in price and rendered more serviceable as an illuminant, gas had progressed even more, not only in a reduction in price, but as an illuminant and for heating and cooking. He hardly knew how far he might go on this subject; but he thought he was right in saying that, taking it all round, the average price of gas then and now, gas consumers as a body obtained on the average now 2000 cubic feet for the price they paid for 1000 cubic feet in those days, besides having five times as much light. He thought he could go further and say that, light for light, and price for price, gas to-day stood far ahead of every illuminant, and it had put out of existence a good many electric lighting installations. He was not a prophet, but could point to something accomplished, and could say that the glorious light of incandescent gas had burst upon the horizon and put out a good many electric installations. This was the result of the activities of the gas engineers and those associated with them; and they were justified in having a large measure of pride in the position they held to-day. But they must not rest and be thankful. He was one who thought that the last word in gas lighting had not been spoken. He believed if they lived a few years longer they would occupy an even better position than they did to-day, as they were a long way from finality in gas lighting. One thing was certain—there was a large field for their activities—a field of great scope and immense possibilities; and he ventured to suggest that much could be done in the way of smoke abatement. Who was going to do this in the interests of the people's health and their happiness? The eyes of the world were upon them, and they were expected to do it. Therefore they had to go on. They would have to go along the lines they had been on, and perhaps achieve this desirable result and make the price of gas even cheaper still, so that it could be used more and more for purposes of heating and cooking. If they could accomplish this, they would have conferred a boon upon the community. Therefore he said to them: "You must still be up and doing, with heart for any fate; still achieving, still

pursuing. You must learn to labour—We will wait." With the toast, he coupled the name of Mr. Kendrick, as President.

Mr. H. KENDRICK, in responding, said that the Manchester District Institution of Gas Engineers had accomplished a good deal for the advancement of the industry, and hoped to accomplish more in the future. As to the remarks made about himself by the proposer, they were too flattering; but he had been given a character which it would be his endeavour to live up to. He thanked Mr. Nicholls for his remarks, and the references he had made to the work of the Manchester District Institution of Gas Engineers.

Mr. ROBERT WATSON (Doncaster) next gave the toast of "The Stretford Gas Company." He said the members of the Institution present very much appreciated the opportunity afforded them by the Chairman and Directors of the Stretford Gas Company of inspecting their works, and also the hospitality which had been extended to them on the occasion of the visit. They had seen a most compact, well-equipped, and well-managed gas-works. They had previously known something about the Company's career, and they had now had the opportunity of seeing for themselves how the good results were obtained. Therefore they had every reason to congratulate the Company and their Engineer and Manager upon what they had done. From the time the works were established in 1854, the progress had been continuous. There was a set-back in 1906, when the Manchester Corporation acquired, or rather annexed, the Chorlton-cum-Medlock area; the make of gas falling from 343,238,000 cubic feet in 1905 to 334,052,000 cubic feet in 1906. Still, in spite of this, the Company next year more than made up for the loss in output through Chorlton being taken from them; and since 1907 they had progressed until to-day the undertaking was one of great magnitude, making 400 million cubic a year, and selling gas at 1s. 11d. per 1000 cubic feet for power, with a maximum of 2s. 3d. for lighting purposes. On these results they could heartily congratulate the Chairman, the Vice-Chairman, and Directors of the Company, as well as the Engineer and Manager. Mr. Galloway, the Chairman, had been associated with the undertaking as a Director for twenty-seven years, and been Chairman some twelve years. It must have been a matter for considerable satisfaction to him and his co-Directors to watch the progress the Company had made up to the present time. Along with the other members of the Institution, he (Mr. Watson) hoped the Company would continue to prosper; and they also wished their esteemed President, Mr. Kendrick, every success.

Mr. GALLOWAY, in responding, said they had the satisfaction in knowing that the Stretford Gas Company, if not at the top of the scale in the gas world, were not far down the list, and stood very well to the fore. Their make of gas in 1895 was 182,503,000 cubic feet; in 1909, it was 365,971,000 cubic feet, exactly double. To have increased the make in 15 years by 100 per cent. must be regarded as a satisfactory rate of progress. He hoped it would continue; and he was confident they were working on right lines. It would be seen from the souvenir prepared in connection with the visit that the Company had adopted many means of increasing the consumption by hiring cookers and loaning grillers, the free cleaning of gas-fires, cookers, and grillers, and the maintenance of incandescent burners. The Directors thought it good policy to look after the consumer; and in this moving forward, Mr. Kendrick had been one of the spurs. In conclusion, Mr. Galloway said it had been a pleasure to him to meet the members of the Institution; and he hoped they had had a pleasant time.

Mr. E. ALLEN (Liverpool) proposed "Kindred Associations." In the course of his remarks, he said that the good feeling which existed between kindred associations was of the greatest advantage to the gas industry, and of great advantage, he might add, to the empire. It was their aim to serve the public with the best light possible, and also gas for heating and power at the lowest cost. It was along such lines they were working; and they hoped the gas industry would go on flourishing. There were other associations besides theirs, such as the Society of British Gas Industries, who were represented there that day by Mr. Marsh, of Manchester. In speaking of kindred associations, they ought not to forget the help they got from manufacturers of gas appliances, whose difficulties were considerable. What they wanted was to have a cosmopolitan meter, with a standard quality of gas and calorific value. Then they could have standard appliances, which would be to the gain of the public. Proceeding, Mr. Allen said they ought also to recognize the assistance they got from the Technical Press, and also from the lay Press which recorded the proceedings of the different associations. Then there was the keystone to the whole edifice, the Institution of Gas Engineers, represented by Mr. Alexander Wilson, the President. Never before in the history of their Institution had those connected with the gas industry received so much assistance from the Council of the parent Association as was the case at the present time. In Mr. Wilson they had a man of very broad sympathies and views; and his presence that day showed the interest he took in the work of the Institution of which he was President.

Mr. ALEX. WILSON, acknowledging the toast, said he was glad of the opportunity of making the acquaintance of the members of the Manchester District Institution of Gas Engineers, and also of having the privilege of inspecting the works of the Stretford Gas Company. These two things had more than repaid him for travelling from Glasgow to Manchester. He desired to warmly congratulate Mr. Kendrick, and the Chairman and Directors of the Company, upon the excellent results they had achieved, as shown by the figures in the booklet which had been presented to them. He was pleased to notice the efforts made by the Company to increase the sales of gas by looking after the consumers. In former years, he was afraid, they as gas engineers had not given sufficient attention to the selling of the gas they manufactured. Though much had been done to improve the quality of gas and to cheapen it to the consumer, they had still a long way to go; and it must be their aim to prove to the public that they had still the best illuminant on the market.

Mr. MARSH, of the Society of British Gas Industries, also responded. He pointed out that during the past hundred years the gas industry had passed through good times and bad times, but gas stocks had always remained firm, which could not be said of other industries; and he had no doubt as to its future. They had many competitors and "live" men engaged in electrical undertakings; so it behoved them as gas engineers not only to improve the quality of the gas but to cheapen it, and give the best light possible with the use of the appliances on the market. He believed the time was coming when the smoke nuisance would be done away with; and gas engineers must see to it that the electricians did not slip in first.

THE BUSINESS MEETING.

The business meeting of the Institution followed in the Lecture Hall of the hotel. Mr. H. KENDRICK, the President, occupied the chair, and was supported by Mr. Alex. Wilson, of Glasgow, President of the Institution of Gas Engineers; Mr. Robert Watson, of Doncaster; Mr. J. W. Morrison, of Sheffield; and Mr. W. Whatmough, the Hon. Secretary.

LETTERS OF APOLOGY.

Letters of apology were read from a number of gentlemen, holding official positions with kindred associations in different parts of the country, who found it impossible to be at the meeting. There was a telegram from Mr. Thos. Newbigging, M.Inst.C.E., expressing regret at being unable to attend.

VOTES OF CONDOLENCE AND SYMPATHY.

The PRESIDENT said that, before proceeding to the ordinary business of the meeting, he wished to refer to the death of Mr. G. B. Smedley, of Swadlincote, which had occurred since their last meeting. It was only right they should give an expression to their sorrow at the loss by death of a member.

A vote of condolence with the relatives was adopted; and the Hon. Secretary was instructed to convey it to the family of the late Mr. Smedley.

The PRESIDENT also called attention to the fact that three of their members were at present suffering from illness—at least, two of them were, and another had met with an accident. Mr. Leonard Hall, of Rhyl, he regretted to say, was in a very serious condition, having had an attack of paralysis. What made his case all the harder was the fact that his wife had become practically blind. He was sure the sympathy of the members would go out to Mr. Hall in his affliction, and the hope expressed that he might soon recover from his illness, and that his wife might recover her sight. Then Mr. Saville, of Penmaenmawr, was ill, having just undergone a serious operation; and they all wished him a speedy recovery. Mr. J. C. Belton, another of their members, had had the misfortune to be thrown from his bicycle. They hoped that his accident was not a serious one, and that he would soon be himself again.

Mr. T. DUXBURY (Oldham) said there was another of their members who had done a great deal of work for the Institution, who was ill. He referred to Mr. Walter Hutchinson.

On the motion of Mr. E. ALLEN, seconded by Mr. R. WATSON, it was resolved that the Hon. Secretary write to the gentlemen named, expressing the members' sympathy in their illness, and expressing the hope that they have a speedy recovery.

APPOINTMENT OF SCRUTINEERS.

Messrs. J. W. Bottomley, of Milnrow, and John Furness, of Slaithwaite, were appointed Scrutineers in the voting for the election of officers, committee, and new members.

REPORTS OF THE COMMITTEE.

The PRESIDENT read the following reports on the two subjects dealt with—

Special Lectures at the University of Manchester.

Gentlemen,—In accordance with the resolution passed at the May meeting authorizing the Committee to proceed with the arrangements for establishing special gas lectures in conjunction with the Manchester Junior Gas Association at the University of Manchester, and to incur an expense not exceeding £20, a Sub-Committee has been appointed consisting of members of both Associations, and a syllabus has been drawn up and approved by the Council of the Institution of Gas Engineers and by your Committee from time to time.

It has been arranged that two courses shall be inaugurated—the first to be in conjunction with the monthly meetings of the Junior Association, to consist of specialized lectures on gas-works, their processes and allied subjects, as follows:—

Oct. 1, 1910—Chemistry of Gaseous Combustion, Professor H. B. Dixon, M.A., Ph.D., F.R.S.
Nov. 5, „ —Internal Combustion Engines, Dugald Clerk, Esq., F.R.S.
Dec. 3, „ —Carbonizing, H. G. Colman, Esq., D.Sc., Ph.D.
Jan. 7, 1911—Construction as Applied to Gas-Works, C. Hunt, Esq., M.Inst.C.E.
Feb. 4, „ —Chemical Control of Gas-Works, J. T. Sheard, Esq.
Mar. 4, „ —Pyrometry, J. A. Harker, Esq., F.R.S.

The first of this series was exceedingly well-attended; and your Committee earnestly trust that members will turn up in increasing numbers at the remainder, which in their estimation constitute one of the most ambitious series of lectures relating to gas matters that have ever been arranged.

The second series, which has been arranged, consists of twelve lectures and demonstrations on the chemistry of gaseous fuel and flame, designed for those who have already acquired a knowledge of gas manufacture.

The syllabus was: Kinetic Theory of Gases. Pressure of Condensable Vapours. Nature of Chemical Change. Flame and its Structure. Theory of Luminous and Non-Luminous Flames. The Ignition Points and Specific Heats of Gases. Temperature of Flames. Phenomena of Explosion in Gases. Pyrometry. Standardization of Thermo-

Junction Pyrometers. Constant Temperature Furnaces. Calorimetry. Preparation of Pure Gases. Manipulation and Analysis of Gases. Theory of Fractional Distillation and Condensation.

These lectures will be given by Professors Dixon, Carpenter, and Petavel, Dr. Lapworth, Dr. Norman Smith, and other members of the staff.

The first meeting was held on Monday, Oct. 17, at 7 p.m. Fee, £1 1s. for the course. It is expected that some of those attending this course will undertake some research work in connection with gas problems.

These lectures will supply the needs of the general body of gas students; while the evening classes will meet the requirements of special students without in any way interfering with the Technical Schools or any other similar course. It is intended that the evening lectures shall be so prepared that they will have a direct bearing on the gas industry. Experiments are to be conducted by the students. Considering their advanced character, the attendance at the opening lectures has been fairly good.

Professor Dixon in his remarks at the opening meeting said: The advantages of experimenting in those (gas) problems in the laboratory was that many of them could best be attacked on a small scale, where the conditions were more under the control of the experimenter. The man who had seen the conditions necessary for success would be better able to guide and direct operations on a large scale. For that reason he welcomed what he hoped would be a lasting connection between the University and the gas industry of that district.

Your Committee join with Professor Dixon in his hopes, and trust that all the members will loyally support him in his aims, so that the status of the gas engineer will be raised to the same rank as the other engineering professions and the gas engineer be considered as a scientific man, rather than as a kind of glorified stoker as was the practice to treat him in some quarters.

Your Committee desire to thank Professor Dixon for meeting them so generously and for the many services rendered to the industry. The Manchester Junior Gas Association have earned the undying gratitude of the profession in forcing this question to the front, and in making the first negotiations which made their consummation possible, and to them must be given the praise for carrying through the arrangements.

On behalf of the Committee,
(Signed) H. KENDRICK, President.

Education and Authorization of the Gas-Fitter.

Your Committee have had these questions under consideration from time to time since the matter was placed before you at the May meeting, and have been in communication with the Institute of Plumbers, who have referred the whole subject to the Advisory Committee on Plumbing to the City and Guilds of London Institute, which consists of representatives from the Institute of Plumbers, the Worshipful Company of Plumbers, the General Council for the National Registration of Plumbers, and the United Operative Plumbers' Association of Great Britain and Ireland. This Committee have not yet fully considered the communication sent by your Committee, and are expected to forward a definite reply at an early date.

Your Committee are pleased to be able to report that classes in gas-fittings and gas-appliances have been commenced at the Manchester and Salford Technical Schools. At Manchester, the ordinary course of "Gas Supply" has been extended and modified, with a view of meeting your recommendations; but it is difficult to say how many students the special course suggested has attracted there. At Salford, a special class in the subject has commenced, with an average attendance of 42 students. The syllabus, as already laid before you, is being strictly followed. The students are not altogether those your Committee hoped would attend, as they are all connected with gas-works or gas-plant works; and inasmuch as no gas-fitter or plumber has attended the class, it is a great disappointment to your Committee. The plumbers and gas-fitters of this district have been appealed to by the various managers and the authorities of the Technical School without any result; and until the Master Plumbers' Association are roused, it seems likely that our efforts are perhaps doomed to failure. The Master Gas-Fitters' Association of Birmingham are considering the subject; and a communication has been received from them, asking for particulars of the classes held in the district, and the result of the negotiations with the Plumbers' Association. Copies of the report and correspondence are being prepared, and will be forwarded to them in due course. Communications have also taken place with the President of the Ironmongers' Association; and he has promised to bring up the question of authorization and education at their next meeting.

If we are to be successful in our endeavours, all our members must interest themselves in the questions, and in and out of season urge upon the gas-fitters and plumbers the necessity of putting their houses in order if they and ourselves are to successfully meet the competition of our rivals.

On behalf of the Committee,
(Signed) H. KENDRICK, President.

DESCRIPTION OF THE STRETFORD GAS-WORKS.

A description of the Stretford Gas-Works by the President was taken as read, and will be found in another part of this issue.

THE PRESIDENT'S ADDRESS AT THE ANNUAL MEETING.

The Postponed Discussion.

The discussion on the President's Inaugural Address, which was postponed at the February meeting for want of time, came next.

Mr. KENDRICK said that in his address he raised a good many points of interest to the members generally; and he hoped that something could be made of them, and that from the discussion he might gain some information for himself. He had very little to add to the facts and figures given in the address; but as no doubt the main point of the discussion would turn on his carbonization results, it might be of interest to tell them what they had done since the address was read. The average yield per ton for the half year ended December, 1909, was 11,512 cubic feet; and for June, 1910, the average yield was 11,598 cubic feet. They had found, too, that by the use of the pitchpine boards in the hydraulic mains, they secured better results than from the red deal boards; the figures for the three months ending September being 12,023 cubic feet per ton, 513 B.Th.U. net, and 17·82 candle power. He could not say so much for what had been done in the diminution of naphthalene; for with the increased make they had had an increase of naphthalene, and therefore had to resort to the use of more solvent. The examination of gas-cookers and gas-fires had resulted in a very considerable increase in apparatus let out, and greater satisfaction to the users. His views on the question of fixing cookers and grillers free, and also in regard to wet and dry meters, were still the same as expressed in the address.

Mr. T. DUXBURY (Oldham) said that at the February meeting he complimented the President upon the very useful information contained in his address. Since then he had had an opportunity of going through it carefully, and found that it embraced a great deal of information which would be useful in years to come. It appeared to him, on thinking the matter over, that it was scarcely wise for the President's Inaugural Address to be the subject of discussion. A president in his address on taking the chair ought to be allowed a certain amount of latitude for the expression of his views, without being subjected to having them discussed. He was afraid that, if the President's Address was to be the subject of discussion, it might have the effect of preventing some bringing forward matters of interest to the members generally. However, the President had invited discussion, and they accepted the invitation. There were two or three points in the address to which he would like to refer. With regard to the remarks of the President on the Commercial Sections, most of them were aware that his (Mr. Duxbury's) sympathies were entirely with the Commercial Sections. He knew they had done a great work, and were doing so to-day—not only in Lancashire and Yorkshire, but in other parts of the country. Members of the Commercial Sections would, no doubt, pardon him when he suggested that there were many technical papers read and discussed by them which might with advantage be dealt with at the ordinary meetings of the Institution. Those present knew the difficulty which their present Secretary had in getting papers; and if some of the subjects brought before the Commercial Sections were dealt with at ordinary meetings, he thought it would be of advantage and far better for the Institution. He did not want it to be understood that he was in any way antagonistic to the Commercial Sections. He merely mentioned this matter so that they might get papers of interest brought before the ordinary meetings. Turning to the question of vertical retorts, he entirely agreed with what the President had said as to their reducing the cost of labour, but he had some doubt as to whether it would mean a reduction in the price of gas to the consumer. Though they had no definite information as to the capital outlay, wear and tear, and renewal charges, it seemed to him the cost would be greater than with horizontal or inclined retorts. He did not see why the charges for inclined retorts should be heavier than horizontal retorts with stoking machinery. As the President of the Institution of Gas Engineers had had some experience of vertical retorts, he should like to have his opinion as to what he thought the capital charges, wear and tear, and renewals would be in their case. He agreed with Mr. Kendrick that the yields per ton and illuminating and calorific values obtained with verticals were not unattainable with horizontals, and that their friends who had been experimenting with heavy charges, and eight or ten hour carbonization, were to be congratulated upon splendid results. It was a fact that yields of 12,000 cubic feet per ton and over of gas of good illuminating and heating value were readily obtainable, but for the most part only within the reach of works having an installation of power machinery. There was one thing about the vertical retorts—they would help engineers to get rid of the smoke nuisance. At the present moment, he was having complaints from two different authorities as to smoke nuisance created from the retort-houses at the works of which he had charge, and which were in districts outside Oldham. His Committee had had notice from the two outside authorities on the subject; and a good deal of correspondence was taking place with reference to it. If by the use of vertical retorts the smoke nuisance could be done away with or minimized, it would be a great advantage. The continuous system of verticals was almost a perfect system of smoke prevention. They had no smoke given off, and in this respect the vertical retorts were much better than the horizontal or the inclined ones with stoking machinery.

Mr. E. A. HARMAN (Huddersfield) said that they must all congratulate their President on his very able and comprehensive address, which he had so kindly thrown open to discussion. It had been so thoughtful, and had covered so many subjects of vital importance to gas engineers, that the discussion ought to be of a very helpful and instructive character. They could not all be experts in every branch of the profession; and it was to their mutual advantage when members contributed their quota of information on subjects of which they had made a speciality. On hearing the address, he was particularly struck with one point in which their President's experience was evidently at variance with his own. He referred to the subject of coal testing. He did not wish his remarks to be construed in any way as a criticism of the address. Only admiration could be expressed for the way in

which the value of coals was arrived at, provided the yields of gas and residuals obtained in the test were a correct estimate of the corresponding yields obtained on the manufacturing scale. It was on this point that his experience of coal testing was at variance with the President's; and in his judgment it was worse than useless to make elaborate calculations of coal value when the figures on which the calculations were based were not correct. It was a recognized fact that coal testing was a difficult and tedious business, and that the results varied greatly with the type and size of apparatus employed. Samples of the same coal submitted to many independent analysts would yield as many different results, which might vary among themselves by as much as 50 to 60 per cent. In June, 1904, a paper on this subject was submitted to the Institution of Mining Engineers by Mr. G. P. Lishman, who came to the conclusion that not only were independent tests by different analysts unreliable, but, even working with the same plant under carefully regulated conditions, the results were extremely unsatisfactory. Small variations in the temperature of the retort, condenser, &c., had marked effects on the results of tests of short duration; while one very potent factor was the quality of the coal carbonized during a previous test. He suggested the use of a standard coal, a sample of which was carbonized on the same day and under the same conditions, and the results compared. But this was evidently too cumbersome a method for everyday use. At Huddersfield they had worked with both the 2·24-lb. and 28-lb. per charge plants; and, in the main, the results confirmed the observations of Mr. Lishman. They had found that when testing a series of sample coals it was possible, by observing due precautions, to obtain sperm values for the coals which nearly represented their relative gas-making qualities, but that the results obtained for residuals other than coke, and especially the yield of ammonia, were very misleading, and that no value could be attached to them in determining the "residuals" value of the coal. When the testing became a matter of checking the quality of coal delivered under contracts, the difficulties were immensely increased, and the results were not sufficiently reliable to warrant them in demanding allowances in respect of even fairly considerable variations in quality. In his judgment, it was only when testing on a manufacturing scale that reliable results could be obtained; and this sort of testing was, of course, out of the question in any but very large and very small works. It was interesting to him to note that their President could place sufficient reliance upon his tests to be able to calculate so closely the relative value of his coals; and he must be congratulated on his results. Perhaps he might be induced to tell them what type of plant was in use, and mention any special points regarding his method of working. There were a great many other points of interest in the address which were to be commended to the notice and discussion of other members.

Mr. Alex. Wilson (Glasgow) said he had been much interested in the two reports read by the President. They were all deeply interested in the education of the men who had to do with the outside work of their departments, for it was most desirable they should be fully qualified if the best results were to be obtained by consumers of the gas which was produced. They could always obtain skilled assistance for the work inside; but it was difficult to get men with sufficient skill and knowledge for that which had to be done outside. He hoped that some good would come of the effort which the Manchester Institution were making in this direction. He had been shown the syllabus of lectures arranged for at the Victoria University; and he had made up his mind to take a leaf out of their book and see if something could not be done in the same direction in Scotland. With reference to the question put by Mr. Duxbury, as to vertical retorts, he might say that he first of all took a trip to Berlin in order to see the system in operation there. He had also seen the Woodall-Duckham system. But the Glover-West system was one that he had not seen. He might point out that the circumstances in Scotland were different from those they had to deal with in the South, where they had a different coal; and in considering the question of vertical retorts, he had to remember the class of coke he was to obtain. This was a point about which he was very anxious, and also the quality of gas to be produced. With the Dessau system, he could easily get a better class coke and gas of a high illuminating power (from 18 to 20 candle power); and, as most of them knew, with the Woodall-Duckham system they could get from 17 to 18 candle gas. Taking everything into consideration, they at Glasgow decided to combine the two systems; and theirs might be called the intermittent-continuous system. The manufacture of gas was continuous; while the charging and drawing were intermittent. They took the charges every four hours; and in this manner they obtained better coke, and, in a way, a very much better quality of gas. He was not going to give any figures yet. [Laughter.] This, however, he would say, they got a better return in gas, and of as good a quality as they were getting from their horizontals. They also obtained a much better coke, for which a better price was obtained; and the demand was still increasing. The installation was quite on a practical scale; and they were able to do away with the smoke nuisance. There was no doubt that the vertical system of working was going to help them very much in this respect.

Mr. J. H. Brearley (Longwood) also warmly complimented the President on the mass of information contained in his address; many of the subjects being worthy of careful investigation. With reference to the reports presented by the Chairman on the special lectures at the Manchester University, and the education of gas-fitters, he asked if it would not be better if such reports were printed and circulated to the members along with the notices of the meeting; so that they could have a week's reflection on the matters to be brought before them. These two schemes, which were brought before the Burnley meeting, were not adequately dealt with, and certainly did not receive the consideration from the members that they deserved. He did not put this in the way of a complaint; but simply mentioned it for the guidance of the Committee in the future. With the first part of the report, on the education and authorization of the gas-fitter, he quite agreed; but with the second part, he entirely disagreed. He thought that by a modification of the City and Guilds of London Institute scheme, and an alteration of the syllabus, they would get all that was wanted. He was much interested in this subject; and any suggestions which members could make to him would be greatly appreciated.

Mr. J. W. Morrison (Sheffield) said he was surprised to hear the President say that he found evidence of an accumulation of naphthalene in the gasholder crown. This was not his experience. The naphthalene was generally found in the inlet-pipes; and they at Sheffield kept themselves free of it by the use of solvents, the cost of which, after all, was very small.

Mr. A. E. Mottram (Ossett), referring to the report of the Committee on the education and authorization of the gas-fitter, said the matter was of great importance to master plumbers, who ought to see that their men were trained to give better attention to the work required from them than they had done in the past. He thought master plumbers would see that it would be to their benefit to fall in with the suggestions made. They ought, in his opinion, to impress upon the plumbers that they were going to lose very heavily if they did not adopt the suggestions made for the better training of the gas-fitter. He hoped the Committee would continue their work in this direction.

Mr. R. H. Garlick (Salford) remarked that students attending the Manchester School of Technology, and taking the third course in "Plumbing," also attended the classes for "Gas Supply" which followed.

Mr. E. Allen (Liverpool) said their experience at Liverpool with naphthalene was similar to that of Mr. Morrison. It was not in the crown of the gasholder, but over the inlet-pipes, that it was found.

The President, in his reply, said that he could not agree with Mr. Duxbury's suggestion about the Commercial Sections. The subjects brought before them were almost entirely commercial ones. The technical subjects dealt with were very few, and were of a kind hardly suitable for discussion at a general meeting of the Institution. Further, they were brought forward by men who could not possibly stand up and face an audience like the present to give their opinions, as they did at what he might call the round-table conferences they had once a month. As to the question of vertical retorts raised by him in his address in February, nothing had been said or any information supplied to make him alter what he then set forth. From what information they did have on the subject, it seemed to him the cost of wear and tear and the capital required for vertical retorts would, to a certain extent, overshadow the saving in labour that would undoubtedly accrue. When they were at Burnley, they had some figures given to them as to capital costs; and he thought those present must admit that the cost and outlay would swallow up a considerable portion of the saving in the labour charges. Dealing with a question on his remarks about carburetted water gas and the enrichment costs, he might say the figures he gave were the result of tests carried out at Stretford. The cost of enriching to the extent of 2½ candles by carburetted water gas worked out at 1·18d., compared with 1·61d. for benzol and 1·82d. for cannel. As he stated in his address, he preferred to use the more stable cannel gas instead of benzol, if the carburetted water-gas plant was out of action, and then only turned to benzol if this was unavoidable. With the benzol they obtained better results in the summer time than in the winter. With regard to the remarks made by Mr. Harman on the testing of coal, he did not agree with that gentleman when he said that the system adopted at Stretford was complicated. The tests were not based upon half-hundredweight charges, nor upon a single charge. They did not think of basing their tests or calculations upon any number of charges less than five, and they did not make contracts for less than 250 or 300 tons. As to the finding of naphthalene in the crown of the holder, it seemed strange that he should have had a different experience from anybody else; but he thought he was correct. When the test was made, the holder was fully extended, and the oil was coming forward with the gas. They syphoned from the inside, and the result was what he gave in his address—viz., 31 per cent. from inside the gasholder.

This concluded the discussion.

Election of Office-Bearers and New Members.

The President next presented the report of the Scrutineers on the election of officers and new members, which was as follows:—

President.—Mr. Robert Watson, of Doncaster.
Vice-Presidents.—Mr. Samuel Glover, of St. Helens. Mr. John C. Belton, of Chester.
Hon. Treasurer.—Mr. Thomas Newbigging, of Manchester.
Hon. Secretary.—Mr. W. Whatmough, of Heywood.
Committee.—Mr. John Bond, of Southport. Mr. F. H. Pickles, of Kildwick. Mr. F. D. Richmond, of Heckmondwike.

Auditors.—Mr. Charles Potts, of Hyde. Mr. William Hill, of Stalybridge.

New Members.—Mr. Edgar D. Martin, Ormskirk. Mr. Thomas H. Brown, Hathersage, Derbyshire. Mr. Leonard G. Hall, Rhyl. Mr. Thos. H. Rich, Millom, Cumberland. Mr. Clarence Whittell, Dinnington, Rotherham. Mr. William Rogerson, Bollington. Mr. William Severs, jun., Rainhill, near Liverpool. Mr. Ernest J. Sutcliffe, Deputy Engineer, Bradford. Mr. John Fazakerley, Goole. Mr. James G. Price, Neston, Cheshire.

Mr. R. WATSON, acknowledging his election as President, said he had been a member of the Institution for eight years—ever since he came into the Yorkshire district—and he had been a regular attender at the meetings. During this time, it had been a pleasure to him to make the acquaintance of many of his fellow-members; and he had to thank them for having elected him as their President for the coming year.

THE NEXT UNIVERSITY LECTURE.

The PRESIDENT called attention to the fact that the next lecture of the series of six on gas manufacture and combustion at the Manchester University would be given on Saturday afternoon next; the Lecturer being Mr. Dugald Clerk, who would take for his subject "The Phenomena of Explosions in Gas and other Internal Combustion Engines."

This concluded the business meeting; and the members subsequently had tea together in the hotel.

Herr Friedrich Lux, of Ludwigshafen, has been awarded a gold medal for the exhibit of his purifying material at the Brussels Exhibition; and his coadjutors, Herren Geheimerat Haas and the Kommerzienrat Stradt, at Heidelberg, have received a silver medal.

On the recommendation of the Lord Chancellor, His Majesty the King has been pleased to approve of a number of barristers for appointment to the rank of King's Counsel. Among them is Mr. C. C. Hutchinson, whose name has from time to time appeared in our columns in connection with parliamentary and other inquiries.

Reference has already been made in the "JOURNAL" to the formation of the Road Board, of which the Secretary is Mr. Rees Jeffreys, formerly Secretary of the Roads Protection Association. The Board have just appointed an Advisory Engineering Committee to advise them as to any matters in regard to which, in their opinion, "it would be desirable for the Board to have information or to take any action in order to promote or assist either general improvements or standardization in methods or materials used in the construction or maintenance of roads, or in the collection and dissemination of information in regard to such matters or to road traffic statistics." One of the members is Mr. H. P. Maybury, M.Inst.C.E., the County Engineer for Kent, who a few years ago was Gas Engineer and Manager to the Great Malvern Urban District Council.

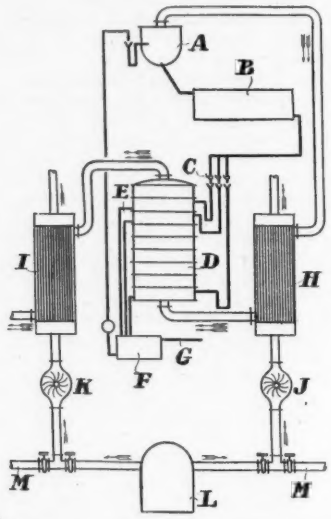
We have received from the Chief Inspector of Factories (Dr. B. Arthur Whitelegge, C.B.) a revised print of the memorandum on the use of water gas, suction gas, and other gases in factories, which has of late years been issued at intervals by the Factory Department of the Home Office. It differs only in a few particulars from its immediate predecessor, which was reproduced practically in its entirety in the "JOURNAL" for the 5th of January last year. It is shown that whereas in the five years 1899 to 1903 there were 51 cases of carbonic oxide poisoning in factories, 17 of them being fatal, in 1906 and 1907 the fatalities were only 14 out of a total of 136, and in 1908 and 1909 only 11 out 108. This lessened mortality is considered to be due to better knowledge of the methods of resuscitation. Accompanying the memorandum is a form of notice, printed in large type, which it is recommended should be affixed in works, detailing the symptoms of gas poisoning, giving some plain directions for "first aid," and furnishing instructions as to artificial breathing.

We learn from the "Newcastle Daily Chronicle" that the commercial community of Quayside have decided to recognize in a public way the generous and public-spirited manner in which the Lord Mayor (Sir W. H. Stephenson), who is Chairman of the Newcastle and Gateshead Gas Company, has discharged the duties of Chief Magistrate, and also the valuable services he has rendered in furtherance of the trade and commerce of the Tyne over a period of many years. Some time ago, a number of the leading men on 'Change felt that steps ought to be taken to mark Sir William's long and honourable association with the business enterprise of the district; and it was intended to pay him some compliment in his present year of office. When it became known, however, that he had consented to accept the mayoralty for another year, it was resolved that a permanent token of esteem worthy of the city and the recipient should be promoted. The opportunity was regarded as most favourable; and a very hearty response has been made in the way of monetary support to the object in view. The Testimonial Committee have made such progress with their work that last week they commissioned Mr. J. Hodgson Campbell, of Newcastle, to paint a portrait of Sir William. It will be hung in the Commercial Exchange, Quayside; and a replica will be presented to Sir William.

REMOVING TAR FROM GAS.

With the view of obviating the distillation of the ammoniacal liquor produced in gas-works and coke-ovens, it has been proposed to send the gases direct into the acid solution intended to fix the ammonia. The success of this operation in practice requires the previous separation of the tar contained in the gas. Up to the present time, this result has been attained by cooling, and has necessarily been accompanied by condensation of water. It has been proposed in various quarters to keep the tar at temperatures at which the water does not condense; and, particularly, to employ liquid tar itself as the vehicle for retaining the tar in suspension in the gas. These matters are perfectly well known. The Solvay Company, however, have devised an apparatus for the removal of the tar without cooling. It consists of the combination of a distilling column with two regulators for keeping the gas at suitable temperatures both at the inlet and the outlet, and another regulator to govern the temperature of the tar supplied. This arrangement is essential for correcting the variations of temperature arising from distillation; and as the working of the appliances requires that all the water should remain in the state of vapour, but without useless superheating, it is necessary to be able to raise or lower as desired the temperature of the gas and the tar.

The column is of the ordinary type of washing apparatus employed in industrial operations; there being only one novel feature in it. The well-known appliances of this nature have only one inlet for liquid at the upper part. Having found by experience that it is not possible to ensure in this way the necessary homogeneity of the liquid washer, the Company have modified the usual action of the apparatus by having a special inlet at each division or series of divisions for the supply of the tar, and also a special outlet. On the accompanying illustration three are shown.



The arrangement indicated effects the methodical recuperation of the tar in the gas by the tar fed into the apparatus in this way—that, as the temperatures of the tar decrease from below upwards, this tar recuperates in succession all the constituents of the gas tar, from the heaviest at the bottom to the lightest at the top of the apparatus. This method of proceeding implies different temperatures at each compartment, as opposed to those processes in which a fixed temperature is maintained. The gas temperature regulators are boxes in which a double canalization allows of the gases which it is desired to heat or cool being brought into contact, without admixture, with a warmer or colder source. The former may, if desired, be the heat of the tars leaving the apparatus, or any other; this being immaterial. In the accompanying illustration, it is the flue conveying away the burnt gases. The most suitable source of cold seems to be atmospheric air, as it lends itself better to admission just where it is necessary by means of valves, as shown in the illustration, together with a ventilator for each regulator. Cooling by a current of water or otherwise is not, however, excluded.

The illustration is almost self-explanatory. The tar coming from the ordinary hydraulic main A passes through the temperature-regulating apparatus B, and feeds, by means of the taps C, each of the compartments of the column D. After having passed through it, the tar flows by the outlets E into the collector F, which is furnished with an outlet G for the removal of the surplus. H and I are the two gas-temperature regulators, J and K are their ventilators, L is the gas-flue, and M the optional inlet of cold air. The course of the gas is indicated by double arrows; that of the re-heating or re-cooling fluid by the single ones.

The William Young Memorial Lecture Fund.—We learn from Mr. Alexander Bell, of Peebles, the Hon. Secretary and Treasurer of this fund, that it now amounts to £640.

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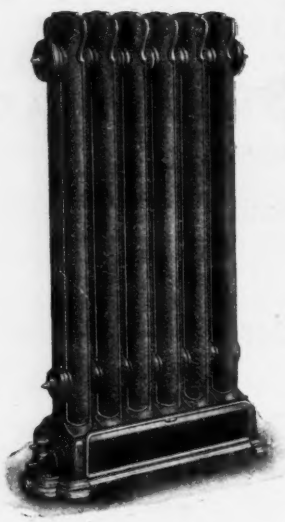

AS the Steamless Radiator has passed its third birthday, we feel this a fitting opportunity to say a few words about the Guarantee with which it started on its successful career. Here is the Guarantee which has accompanied every one of the thousands of Steamless Radiators sent out during the period under review:—

"We guarantee to supply, free of charge, any individual part of this Radiator which, through ordinary wear and tear, may require renewal during the next three years."

Guarantee: To maintain; to support by authority or proof; to justify; to secure; to pledge one's self for; to declare with assurance.—*English Dictionary.*

This is what we do in connection with the "Steamless," and during the three years it has been on the market we have not been called upon to replace a single part under the conditions of our Guarantee.

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IN KEEPING WITH THE TIMES.

Seen at the London Show-Room of Fletcher, Russell, and Co.

If there is one firm who should be in the very forefront in the making of advances in gas heating, that firm is Messrs. Fletcher, Russell, and Co., Limited; for we think no one will deny that they were the pioneers in gas heating. Many of us remember personally Mr. Thomas Fletcher; many of those now in the gas industry only know of him by name, and as an ardent worker in this particular direction of gas heating. He entertained a robust belief in the great possibilities that there were in gaseous fuel, and in it eventually rising to a position of no mean eminence among the necessities of human life. By his gifts, his research, his foresight, he built up for the firm a reputation for, within the limits of knowledge and opportunities of the time, providing the means of usefully and economically employing gas for heating purposes. But it is long since Thomas Fletcher left for ever the ranks of the industry's workers in the cause of progress. He left behind for the firm an excellent reputation for good workmanship which they have ever maintained. But for a time, it must be confessed, the trace could be detected of a little conservatism in certain respects. Had he who made the gas-heating branch of the Company's business what it was, been with us in these times when the gas-fire is booming, when we seem to be on the threshold of great things in connection with it, when, too, the gas-supply industry is considering seriously the question of the supply of B.Th.U's. at the cheapest possible rate instead of illuminating power, think anyone who knew him that he would not have been in the very van in meeting the situation and prospects which must be clearly defined to-day to every observant gas man. His instinct was such that it would not have allowed him to lag behind in the march of progress.

There are those in the firm who fully appreciate all this; and they are at the helm to-day. And Fletcher, Russell, and Co. are moving in keeping abreast of the requirements of the times. This is seen in looking round their London show-rooms; for there are observed fires which, for both appearance and efficiency, should meet popular taste and demand. We may specially refer to the "Palermo," "Borneo," and "Tokio" fires as types. Here we have got away from the old highly ornamental casings, with scroll, floral, and other decoration making convenient lodgment for dust.

The "Palermo" Fire.

The "Borneo" Fire.

That form of casing has had its day. There is art in the design of an external casing that presents a plain, high-finished surface, with simple ornament and graceful outline. Look at the pictorial presentments of the new fires mentioned; and there is illustrated the meaning, if words do not suffice. These three appellants for consideration and favour are made with 10-inch fires; and the "Palermo" and the "Borneo" with also 13-inch fires. And every vital part of the 10-inch series is interchangeable; and the same is the case with the 13-inch fires. The more the use of gas-fires spreads, the greater becomes the importance of interchangeability in connection with maintenance. The fenders are kept in position by lugs fitting into slots. The burner can be removed by merely lifting it up and pulling forward, after disconnecting from the gas supply. The fire-clay lining is built up in parts that allow of easy replacement and, what is also of importance in the most vulnerable parts, of free expansion and contraction. The fire-bars are also easily removed. Mentioning fire-bars, it will be noticed that these have been reduced to the minimum, and pleasing designs have been introduced. The firm are not converted yet to the use of the barless fire. They point out that people speak of these slight bars as though they were terrible obstacles to the radiations of the fire; whereas, as a matter of fact, they represent superficially a very small proportion of the incandescent fuel surface, and they are not themselves by any means cold when the fire is in service. Therefore, from whatever ground their use is regarded, the firm submit that the reasoning advanced for the omission of the bars from the structure of the gas-fire is not sufficient, more especially if, in any whit, safety is sacrificed.

Then as to the burners of these new fires, they are of Messrs. Fletcher, Russell, and Co.'s patent non-lighting-back type. The firm have always had a good reputation for gas-fire burners, and that reputation is being maintained by those that are fitted to the new fires. The burners are also furnished now with gas and air adjusters; and while rendering a good duty, they are economical. Proof as to the efficiency of the burner and of the means of regulation is found on examining the fires in use; and the brightness and cheerfulness of the fire presented also suggest that the firm have obtained what they have been long searching for—a good material for the elongated form of "fuel" which is now the order of the day in shallow fires, and for permitting free combustion up the centre of the fuel. The method, too, of manufacturing the "fuel" also tends, it is claimed, to give it a brighter appearance. In this series of fires, we like the simple construction and the good, clean work put into them; users (with us) will like the elegant appearance and the economy; and gas companies and other authorities purchasing will not disapprove of the low prices. The elegant appearance of the fires reminds us that the majolica enamels of the firm have not been deposed from the high esteem gained over long years for durability, beautiful surface finish, and an unexcelled range of colours—a range that enables the fires to meet any scheme of room decoration. The demand for a dull black or art black surface, too, has caused the firm to work up to a high standard of finish in that regard. But withal, the demand for the Berlin black finish with its lustrous surface does not die out. From the illustrations, it will be seen that the "Palermo" and the "Borneo" fires are particularly suitable for drawing-rooms; while the "Tokio" is specially suitable for bedroom or nursery purposes.

The "Tokio" Fire.

The "Floresta" Radiator.

The last-named fire is fitted with a boiling-burner on top, which is removable (by simply lifting up and dropping in position again) for cleaning. Not any of the stoves takes up much room—their depth from front to back being only 6 inches, except in the case of the "Tokio," which is 6¼ inches deep.

If anyone, however, wants a similar fire to those described, but of a more ornate pattern, the "Athena" may be taken as a good example. Then for halls, shops, and such like, there is the "Floresta" radiator, about which a few words may be said. As the flame in this is a luminous one (an argand burner being employed), there need be no cavilling by anyone, not even by Home Office inspectors, regarding their use without having chimneys attached. The "Floresta" reminds us of the firm's "Floral" radiators. It is on the same principle, save that the flame is visible (which is for cheerfulness rather a recommendation). It is fitted with a ruby chimney, and copper reflector—and, in short, one experiences quite an air of comfort on looking at it. Each single tube radiator is an entity—self-contained in all respects; and pretty and pleasing effects can be obtained by grouping back to back, making (for instance) a cluster of four, for setting in the centre of a hall, shop, or elsewhere. For this purpose, the group can be finished by using special stands and coronas. Or, again, they can be arranged in rows in any number; stands being employed for this purpose.

We ought not to omit mention of the extensive range of gas water-heaters that the firm have made. As we look along the lines of examples, it is impossible to conceive of any purpose in which hot water is required that the firm would have to confess their inability to meet. If one wants a small water-heater for a small household, here it is; if one wants a boiler for a large circulating system, with draw-offs in bath-room, in lavatories, over sinks, and elsewhere to any number, here it is; if one wants a pressure water-heater, without leather or rubber diaphragms to perish or get out of order, here it is; or if one wants a boiler strong and (so to speak) everlasting for use in the factory, garage, or elsewhere, here it is. And looking over all critically, it is seen that, in the advances to economy and convenience, the firm are absolutely in line with requirements.

But there we must leave the many interesting features to be found in what the firm are now offering, though the sketch here only represents a light survey of the large extent of production in which the firm engage, and in connection with which they have set their faces towards still larger expansion.

CARBONIZATION QUESTIONS.

[Paper and Discussion at the Meeting of the Midland Association of Gas Managers last Thursday.]

It will be remembered that at the meeting of the Midland Association of Gas Managers in March (see "JOURNAL," March 8, p. 659), a paper was read by Mr. Alfred T. Harris, of Market Harborough, on "Carbonizing Systems and Results;" but the discussion was postponed until the autumn meeting, which was held last Thursday. On this occasion, Mr. J. S. Lucking, of Clay Cross, read a paper on "Carbonizing in Bye-Product Coke-Ovens, and Some Experiences in Utilizing Surplus Gas Therefrom for Lighting Purposes." This was illustrated by some lantern slides. The paper and the one by Mr. Harris were then discussed together—the opening of the discussion being confided to Messrs. Thomas Glover, Samuel Glover, and J. Ferguson Bell. These gentlemen submitted prepared communications, which we reproduce after Mr. Lucking's paper.

CARBONIZING IN BYE-PRODUCT COKE-OVENS AND EXPERIENCES IN UTILIZING THE SURPLUS GAS FOR LIGHTING PURPOSES.

By J. S. LUCKING, of Clay Cross.

There has during the past few years been a great deal of useful discussion on the subject of the carbonization of coal for making gas for domestic and power purposes; and it appears that a great deal must yet be done before we reach finality on this most important subject. Controversy still rages round the different systems now in use; and whether we are in future to carbonize in horizontals, slopers, verticals, or chamber settings, is still engaging the minds of our most skilful gas engineers. Splendid results are being obtained from all the systems mentioned; and it is very difficult indeed to say at the present time which of them is the best all-round system. Without doubt, locality has a great deal to do with the question, as the system suited to one place might not suit at all where different conditions prevail.

The writer having had the opportunity for the past six years of observing the working of a coke-oven recovery plant, ventures to submit a few brief remarks upon this method of carbonizing, trusting that they may be of sufficient interest to claim attention, and also be the means of carrying the discussion above alluded to a little further.

Some six years ago, the Company of whose gas undertaking the author has the honour to be in charge, decided to have erected a battery of thirty-four bye-product coke-ovens; and these were afterwards increased to fifty of one of the latest and best types [the type in this instance being that known as the "Simplex," Messrs. Fabry and Linard's patents] in connection with their collieries at Clay Cross. These ovens are similar in appearance to many other types, being narrow chambers, 21 inches wide at the charging end, and 23 inches wide at the discharging end. They are 32 feet in length, by 7 ft. 6 in. high. In the division walls, flues are formed, which are really the combustion chambers of the ovens. Gas is admitted into the flues at each end and also on the top. A space is provided round the gas-nozzle for the admission of air for its combustion. Other ports are also provided for the same purpose on the top of the flues.

The ovens are charged every thirty-six hours with 8 tons of washed and crushed slack. Before being put into the ovens, the slack is compressed into a solid cake of convenient size by an electric rammer, or, to give it its more familiar name, a "stamper." It is then carried into the oven on a steel sole-plate, which is withdrawn when the charge has fully entered the oven. The end doors are then put on and luted-up.

The gas is taken off through a hole in the top of the chamber, which communicates with an ascension pipe by which it is conveyed into the hydraulic main (in this case, a dry one). Each ascension pipe is provided with a valve, which is closed during the charging and discharging periods. The discharging is accomplished by the aid of an electric ram, which pushes out the coke clear of the oven chamber. It is then quenched; and, after cooling, it is picked up by hand and loaded into trucks. The gas is conducted through a series of coolers and scrubbers, tar-extractor, through the exhausters, and forced through more scrubbers, and freed almost entirely from ammonia. It is then led directly back to the ovens, to be used for heating-up purposes. Any surplus gas is blown into the air.

The waste heat from the flues is used to generate steam in Lancashire boilers. This steam is used for the purpose of generating electricity for the compressor and ram, and for the coal crushing and elevating plant.

The bye-product oven plant is, of course, designed primarily for the production of good metallurgical coke from a very small class of coal, and as much ammonia as is possible. These two residuals (as gas managers term them) occupy the chief place in the coke-oven manager's mind; and the gas is a detail to which he gives very little attention, so long as he has sufficient to properly maintain the temperature of his ovens. There is, of course, the tar, which equals nearly 60 per cent. less than we usually get in gas-works practice. This tar is also thinner than gas-works tar, where high heats are maintained.

The costs per ton of carbonizing at these particular ovens are approximately as follows:—

	£ s. d.
Coal (as per district prices)	
Wages, including sulphate making	0 1 0
Stores, acid, &c.	0 0 6
Repairs to plant	0 0 2
Total	£
For sale—	
Coke, 12¼ cwt. (as per district prices)	
Sulphate, 32 lbs.	0 3 1¼
Tar, 5 gallons	0 0 6¾
Total	£

There is still the surplus gas, which, from the observations I have taken, should, with good management, equal at least 2500 cubic feet per ton of coal used; or from a battery of fifty ovens a daily quantity of 605,000 cubic feet of gas could be obtained, of about 14-candle power.

The following is an analysis of the gas:—

Carbon dioxide	0·5	per cent.
Carbon monoxide	9·0	,,
Heavy hydrocarbons	3·0	,,
Hydrogen	47·7	,,
Methane	26·2	,,
Nitrogen	13·0	,,
	100·0	,,

Calorific value, 550 B.Th.U.

The writer, wishing to make something out of this surplus gas, obtained permission to take some of it to the gas-works to mix with the gas from the retorts, and send it out on to the district for use. Accordingly, a Körting's steam-jet exhauster was installed at the coke-ovens, and a 6-inch main laid between the gas-works and the ovens—a distance of some 450 yards. I first admitted the gas direct into the hydraulic main, but found that, owing to the gas not coming over in uniform quantities, we had trouble with our exhausters. I then tried it between the Livesey washer and the scrubber. This answered very well as far as the exhausters were concerned; but it upset my scrubbing arrangements, and carried forward nearly all the ammonia that was in the retort gas. At last, I decided to take it in at the inlet to the purifiers. There it gives very little trouble. It deposits some naphthalene at the outlet of purifiers and in the meter inlet and outlet pipes; but I never find any beyond there. It appears to deposit the whole of it almost at the moment that it leaves the purifiers.

In the retort-house, we lowered our heats so as to make a richer gas; and by mixing the two at the rate of 50 per cent. each, we can send out gas of 16-candle power. At times, when the oven gas has been extra good, we have sent into the gasholder as much as 60,000 cubic feet to the ton of coal carbonized in the retorts. This would appear to be a very happy position to be in. But sad to say for my peace of mind, coke-ovens are not worked so regularly as retorts; and we have to keep as many retorts heated up as will make the full quantity of gas required, owing to stoppages at the coke-ovens for various purposes, such as cleaning out the plant, &c. When the ovens are stopped for three or four hours, it is often thirty-six hours or more before there is any surplus gas. This is a serious drawback to using oven gas for gas-works purposes. The difficulty could, of course, be overcome by putting in a gasholder large enough to carry the ovens over the period of stoppage. Had I foreseen this difficulty, I should not have been quite so eager to have this surplus gas; for it has caused me many very uneasy hours, as the stoppages usually occur at some inconvenient time for the gas-works, and there is rarely any warning given.

The gas, so far as quality is concerned (owing to the careful regulation of the exhauster at the ovens, so as to keep the pressure in them at level gauge), is fairly regular; and it is very rare indeed that it falls below 14-candle power. It contains a larger percentage of sulphuretted hydrogen than retort gas, some of which is owing to the waste gases from the sulphate plant being returned into the gas after it leaves the scrubbing plant. Consequently, purification (which is done by lime only) costs more with oven gas than with retort gas only.

To sum up. My experience of the past six years has been that all the advantages of a supply of oven gas are counterbalanced by the disadvantages I have indicated; and the only satisfaction I have had is that of having made use of something that was going to waste, and so saving coal for future use. I am firmly convinced, however, that coke-ovens could be made to supply gas for domestic and power purposes if arranged more upon gas-works lines, and were ample storage provided. And I venture to predict that the day is not far distant when a great deal of gas will be made in this way and utilized for these purposes.

The PRESIDENT said he would first read a communication from Mr. Thomas Glover, of Norwich, and then he should ask Mr. Samuel Glover and Mr. J. Ferguson Bell to read their contributions to the discussion.

Mr. Thomas Glover's Written Contribution.

Progress in carbonization has been greater during the last five years than in any period of similar length since Murdoch first distilled coal at Smethwick. Not only have there been great

developments in the mechanical appliances placed at the gas-makers' service, but our knowledge of the conditions necessary for the most advantageous treatment of coal during distillation has increased greatly; and some of our old ideas (to which we clung with persistence) have been shown, by recent experience, to be either entirely wrong or have been modified to a great extent.

The early designs of the Bueb vertical retorts provided ducts or outlets for the gas throughout the length of the retort; but, by experiment, it was found an advantage to take the gas from the top, and allow it to pass upwards through the inner core of uncarbonized coal. This proved to be not inconsistent with a high yield, provided the walls of the retorts were kept at a high temperature. The high yield obtained under these conditions, together with the oily nature of the tars, pointed unmistakably to the fact that too much importance had been attached to the value of the heated duct, through which gas, in an ordinary retort, has to pass on its way to the ascension pipe.

Experiments with heavier charges and longer periods in horizontal retorts—first, I believe, put into practice by Mr. Sydney Shoubridge, at the South Suburban Company's works—showed clearly that there is a gain by reducing the free space above the charge and thus giving the gas less time-contact with the heated walls and for the overcracking, by radiant heat, of the nascent hydrocarbons. Improved coke, thinner tar, less naphthalene, fewer stopped pipes, and high makes per ton, were the results which followed the use of heavy charges and longer periods; and it is no wonder that this is now the regular practice in quite a number of works.

The practicability of filling and discharging retorts was only made possible by the introduction of the newer forms of stoking machinery—more particularly of the "projecting" and the "ram-discharging" type.

The introduction of this type of machinery, and the knowledge that full retorts did not detract from the production of high makes per ton, made it possible for me to experiment with a modified form of coke-oven setting. The setting and the mechanical appliances necessary for working it have already been described, and the results obtained have been published; so that it is only necessary for me to give you some impressions and facts obtained by working this form of carbonizing plant over a period of two or three years.

Each chamber is entirely filled, except at the ends, where the charge tails-off at its natural angle. The period for distillation is twelve hours; and the charges are completely carbonized and push out readily. The mass of coke is quenched by high-pressure water jets, and is removed by a conveyor. The core of coke on being pushed out splits in a vertical line down the centre, and is denser and greyer than ordinary gas-works coke, but not so massive nor so dense as coke produced in larger ovens at the collieries. The coke from poor coking coal is greatly improved by this method. The make of gas per ton is equal to, and frequently exceeds, that which is obtained in the best ordinary retort practice.

The experiment with these chambers was made with a view to seeing if the cost in wages could be reduced by charging and discharging larger quantities at one operation; also to produce a better quality of coke from poor coals, and, generally, to prove whether carbonizing in bulk was advantageous or otherwise, from a gas-making point of view.

Experience shows that the cost of carbonizing is not reduced below that where good machinery and ordinary retorts are used. The chambers, and the installation generally, must be larger to materially affect the wages. The coke is undoubtedly improved where a market for harder coke exists. The gas-making results are quite satisfactory.

The system is not quite so flexible as the ordinary retorting system, and is, therefore, rather disadvantageous in this respect. It is more adapted to large works than to those of moderate or small size.

These observations as to flexibility and adaptability would apply in a much greater degree to the use of larger chambers; and, in my opinion, installations such as are in use on the Continent could be used with advantage only in large works, removed some distance from residential portions of the district of supply. The volumes of steam and smoke produced are likely to constitute a cause of complaint.

Many works are situated in the midst of the district to be supplied, and as purveyors of smokeless fuel and as ardent smoke abatement advocates, it should be our earnest endeavour to make our works as smokeless as possible. This will only be done by continuous carbonization; and it is to be hoped that those responsible for developing this system will be able to prove that all the advantages of good gas making and good coke and other residual production can be accomplished with a reduction of mechanical operations and also with a total abolition of smoke and steam.

Remarks of Mr. Samuel Glover, of St. Helens.

I appreciate very highly the honour you have done me in asking me to open the discussion on the important subject of carbonization, which was brought before us (as members of the Association), in the first place, by the reading by Mr. Harris of his paper recounting his experiences with his setting of eight retorts arranged in accordance with the general principle of what are known in the gas industry as "Love's Forty-Fives," and which has been presented to us to-day in another aspect by the interesting communication by Mr. Lucking.

To help me to study the subject more intelligently from the point of view of these two gentlemen, I have visited both of the works in the conducting of which the data for these papers has been gathered; and I should like to be allowed here (on behalf of our Institution and myself) to thank Mr. Harris and Mr. Lucking and the Managing-Director of the Clay Cross Company for the helpful way in which I was met, and the thorough manner in which I was allowed to follow out my examination of the process of carbonizing carried out on their works.

Many of our members know how thoroughly Mr. Harris studied the system of inclined retorts he adopted, and with what care the setting was erected, tested, improved, and worked, and the results which were obtained; and Mr. Harris informs me to-day that this same setting is still at work and is very much in the same condition as it was at the time of my visit.

I was very much impressed, however, not for the first time, with the inherent weaknesses of the "slopers," some of which were apparent after Mr. Harris had done his best with the forty-fives and worked the bed for only a short time.

> The uneven heating of the several retorts in the one setting—a vital fault, and this after Mr. Harris had removed the centre disturbing factor, the "bull's-eye" of the setting.
>
> The irregular lengths of time required to burn-off the charges, owing to the above-mentioned uneven heating.
>
> The severe strain put upon the retorts and their setting when heated and worked in this manner tends to distortion of the retorts and disintegration of their settings.

This leads, as a natural consequence, to considerable interference with the even charging and the easy discharging of the retorts.

These and other defects discount very largely, in my opinion, the advantages claimed for the system of inclined retorts. They may be considered, however, to have been a step in the right direction, and to have been in some works (where they have been carefully designed and constructed) an advance on old-fashioned horizontal settings with hand charging.

Consideration of the possibility of a supply of lighting gas from coke-ovens used as subsidiary to an ordinary gas-works has been before this and kindred institutions on previous occasions; and I rejoice with you that we have lived to see the day when we have had the experiences of doing this related to us by a man who has done it.

We are thankful to Mr. Lucking for coming forward and giving us the benefit of his experiences, and to the Clay Cross Company for granting the necessary permission, as these experiences throw another gleam of light on the pathway we are travelling along in trying to arrive at truth about the relationship of these things to our work as carbonizing engineers.

I quite agree with Mr. Lucking's conclusions. The output of gas from coke-ovens is controlled by the rise and fall in the demand for coke and not in the demand for gas. This arrangement will not, therefore, keep-step with the needs of the carbonizing engineer who is responsible for a public gas supply. No; such an one might parody Tennyson's "The Brook," and say:

> Ovens may come and ovens may go;
> But my pure steam must flow on for ever.

The communication which we have had to-day from Norwich confirms our idea as to the want of flexibility in any system of ovens or chambers; and it suggests that we should look for a cleaner as well as a more flexible process of carbonizing gas coals in our cities and towns. Coke must be the first consideration where ovens are used. We cannot, however, slacken in our endeavours to find the best methods of carbonizing the ever-increasing quantity of gas coals we have to handle. The demands upon our skill are more pronounced than ever. The coal carbonizing engineer must clearly realize that it is his duty to treat whatever coal he handles in such a way as to get the greatest total measure of value from each ton—that is, not only in gas of the most efficient illuminating and heating value, but also in tar and its products—ammonia and cyanogen compounds; while producing coke of good quality useful for both domestic and manufacturing purposes. He must do all this at as low a cost as possible, and with as little public nuisance as possible; for there is a distinct and growing agitation demanding that while we are making so much smokeless fuel for other people to use, we should not make such a smoky and dusty atmosphere ourselves, in the neighbourhood of our manufacturing stations.

What, then, is being done? Since the advent of the full retort, we have heard a good deal about the rehabilitating of the horizontal system; and to get the best possible work out of this system is quite right and proper in face of the capital charges still standing against it. But even when it has been rehabilitated all it can, it will still be the same old "prodigal son" making great demands for its level support, and upon the power required to get anything into him—and more to get anything out of him. And to-day, notwithstanding all that has been done to improve the education of the carbonizing engineer and also to improve the horizontal and inclined settings with which the bulk of the work is still done, one is continuously hearing of, and seeing in works inspected, stopped ascension pipes, pitched-up mains, and the use of all kinds of fantastic bridge-pipes and dip-pipes to help to overcome the evils set up in the irregularly heated and irregularly charged retorts, the insides of many of which are at the end

of each charge festooned with decomposed hydrocarbons. The gas-coal carbonizer has even yet with the old (and even with some new) systems of carbonization sadly too little control of his make of gas per ton of coal, and of the quality and quantity of liquid hydrocarbons he will make per ton of coal. Nor has he sufficient control of his operations to provide a steady suitable quality of illuminating power and regular calorific value; and these important points cannot be controlled merely by "putting on the exhauster." Nor can the proportion of retort carbon be controlled; and this is one of the most costly products of our inefficient retorting systems.

None of these important factors of our daily output can be efficiently controlled by the most efficient intermittent carbonizing process, in all of which the product is a hash made up of firsts, middles, and dregs.

I am fully persuaded—after years of experience, and many more years of study, during which I have been associated in my work with some of the best men in the profession, have travelled far, and received visits from earnest students from the five Continents of the globe—that the future is to be met by means of the British system of carbonizing gas coals in vertical retorts worked on the continuous system. It is a system which, in the opinion of the large number of experienced coal carbonizers who have seen it, most nearly approaches the ideal, in the regular and natural way in which the coal is distilled—giving a constant stream of gas, of regular quality, both as regards illuminating power and calorific value, with a minimum of dust, and an absence of steam and smoke. There is no red coke to slake—in fact, entire absence of slaking of coke; the heat of the coke having been returned into the setting. There are no black mouthpiece ends of coke; but all the continuously discharged coke is beautiful steely grey lustrous coke. There is a minimum of space required for a given output; the condition of the stoker's duties is so altered that he is no longer a stoker in the ordinary sense, and with the possibility of reducing the working costs per ton from the 2s. 6d. we used to pay in the old days to (possibly) 2½d. per ton when adopted on a large scale. Mr. President and Gentlemen, I hope we may all be there to see it.

[Mr. Glover then called attention to some samples of coke from the St. Helens vertical retorts, as well as a sample of the tar and distillates. There was also on view a sample of the coke from the Norwich chambers.]

Mr. J. Ferguson Bell (Derby) read the following:

Certainly we are all indebted to Mr. Harris for bringing before us, in a most admirable paper, his experiences with semi-vertical retorts, or inclines set at 45°, instead of the usual angle of about 32°; and all will join the author in sincere regret that Mr. Love, the pioneer, was not spared to bring his system of semi-vertical retorts to a greater degree of perfection, as evidently they were not all that could be desired, or the Directors of the Guildford Gas Company would not have replaced them with a new bench of horizontals operated by machinery.

We must not, however, judge too hastily, as I understand the inclines set at an angle of 45° erected by the late Mr. Love at Guildford were more or less of an experimental character; and it is hardly to be expected that success would attend a first effort. But Mr. Love was a man to whom difficulties were only obstacles to be overcome; and I feel assured that, had he lived, we should have seen and heard more about semi-vertical retorts. Therefore, I am extremely glad that so practical and experienced a carbonizer as Mr. Harris has taken them up; and I trust that further experience will enable him to demonstrate that they are an advance on ordinary inclines, which, though much favoured a few years ago, are generally admitted to be inferior to horizontal retorts operated by the later forms of stoking machinery.

Inclines during the past few years have practically stood still as regards improvements, whereas horizontals have advanced; and we shall all be glad if Mr. Harris is able to restore them to favour again, by setting them at a steeper angle, and filling them up with heavier charges. Mr. Harris has, in my opinion, wisely adopted full-depth regenerator furnaces; but it is unfortunate that he was not able to experiment with retorts longer than 11 feet, which must increase the fuel account besides the capital charges per ton of coal carbonized and unduly reduce their productive capacity.

Mr. Harris's trouble with excessive back-pressure in the retorts (more especially the bottom ones) could no doubt have been remedied, or at least very considerably reduced, by charging with coal of an even mixture—I mean small and large coal equally mixed—the plan often adopted when charging verticals.

With the steeper retorts, I shall be glad to know if Mr. Harris is at all troubled with an excess of tarry matters at the bottom ends of them.

I am not prepared to endorse the author's criticism in respect to verticals, which, it appears to me, have come to stay; and when it is remembered that the intermittent vertical system has only been before us a comparatively short time, while the continuous and almost continuous vertical systems are of much more recent origin, some numbering only a few months—seeing the success they have already achieved, I think it unwise to pass too severe strictures upon them, although in my opinion there is no necessity for scrapping horizontal retorts, as by the modern method of filling them up, most of the advantages of verticals may be obtained.

In Germany, when enlargement or modernization of carbonizing plant is under consideration, attention is almost always exclusively confined to the relative merits of the Dessau vertical retorts or Munich inclined chamber ovens; and a brisk controversy is now being carried on by various partisans of the two systems. Horizontal retorts operated by machinery and continuously worked verticals, it seems, at present possess little or no attraction in Germany. And it must be admitted—perhaps in consequence of gas coal being much dearer there than in this country—that our German *confrères* are skilled technicians; also that their carbonizing results are tested and tabulated in a very much more accurate and precise manner than is generally adopted here, and that they are quicker to adopt newer methods.

Bearing in mind the large number of illustrations of Dessau verticals, and more recently inclined chamber ovens that are at work, and are being erected on the Continent, they appeal to me for further investigation and anxious thought, to approach this most important matter of the best system of carbonizing with an open mind—that is, if there is any best system.

I am inclined to think the various systems, all of which will perhaps be found better suited to one town or district than to another, will in time prove their special adaptability.

There is no shadow of doubt in my mind that Dr. Bueb's vertical retort system is a good one. Much credit is due for the careful investigations, experiments, and technical skill of a high order, extending over several years, before the Bueb vertical retort installations were brought to their present state of perfection. It is to the honour of Dr. Bueb, Herr Körting, and the colleagues who collaborated with them, that we have the vertical-retort system. They proved its success; and I think it only right to give honour and credit to whom due. While saying so much for the Dessau system, I am glad in this country at any rate that we are not satisfied to accept it or any other system wholesale, and adopt the "rest and be thankful" attitude. This is due perhaps to more independent temperament, which makes us unwilling to accept things as they are. We want to improve upon them, with the result that independent experiments are carried on. This may not be in an economical sense sound; but the gas industry, like most others, owes its success to individual efforts, and I hope they will continue.

Hence, the possibilities of the vertical system being proved, others in this country have set to work, with the result that we now have a choice of several good vertical systems.

Mr. Harold Woodall and Mr. Duckham are pioneers in the continuous vertical system, carried on in the face of difficulties, most of which, if not all, I believe, are now overcome. Another well-known carbonizer, Mr. Samuel Glover, of St. Helens—in conjunction with Mr. West, who deserves great praise for his mechanical genius in inventing stoking machinery—has a very successful vertical system. When at Glasgow some three weeks ago, I had the privilege of inspecting an installation of Mr. Alexander Wilson's vertical retorts. It much impressed me; and I believe more will be heard of it.

However, for many years, most of us have carbonized our coal in horizontal retort settings. They have served us well; and, by filling them up, most of the advantages claimed for verticals may be obtained with greater elasticity, as light, heavy, or filled retorts may be adopted.

I hold no brief for any system of carbonizing; but I may perhaps claim to be one of the pioneers of filling up horizontal retorts, which has been designated by Mr. Browne, of Vauxhall, as a "rehabilitation" of the horizontal retort.

Mr. Carpenter, the Chairman of the South Metropolitan Gas Company, and Mr. Shoubridge, of Sydenham, are able to show splendid carbonizing results; and no doubt many others can justly claim to be pioneers of the system of filling up retorts, by increasing the weight of the charge, with corresponding longer period of carbonization.

In 1905, at our Cavendish Street works, Derby, we were working 5 cwt. charges of 4 hrs. 48 mins. duration, or five charges per diem. The retorts at this works are 21 in. by 15 in., ⏢ section, by 18 feet long. The average make of gas from small ordinary Derbyshire gas coal is 10,300 to 10,500 cubic feet per ton. In 1906, we adopted 6 cwt. charges of six hours' duration, with the result that our make increased to 10,800 cubic feet per ton.

In 1905 and 1906, we were much troubled with stopped ascension pipes. In 1907, the weight of charge was further increased to 8 cwt. in eight hours; and the production of gas increased to 11,000 cubic feet per ton.

From 1907 to 1910, the weight of charges has been gradually increased to 12 cwt. in twelve hours, and more recently up to 14 cwt. in fourteen hours, which completely fills the small retorts from end to end. The make of gas has increased to 11,500 or 12,000 cubic feet per ton, depending upon the quality and grade of coal carbonized. I am not prepared to state if carbonizing with retorts filled from end to end is better, so far as make of gas is concerned, than with charges leaving a small space of 3 or 4 inches above the top of the coal to form a duct for the gas.

During the past five years, our illuminating power has decreased from about 17 to 16 candles—No. 2 burner. But the calorific value has remained practically constant—being an average of 145 to 150 calories gross, or 130 to 135 calories net, per cubic foot.

In any attempt to increase the volume of gas made per ton of coal used, special care should be taken to see that it is gas of good quality that is being produced—not a mixture of coal gas *plus* furnace or other non-combustible gases, which are no use to the consumer, and are harmful diluents. There was a valuable paper

read by Dr. Davidson, of Birmingham, at the last meeting of the Institution of Gas Engineers, in which the deleterious effect of 1 per cent. of different non-combustible constituents in calorific value and illuminating power are given with gas of 540 B.Th.U. of 16-candle power.

	Calorific Value.	Candle Power.
CO_2 = ..	− 1 per cent. ..	− 3·5 per cent.
O = ..	− 1 ,, ..	− 3·0 ,,
N = ..	− 1 ,, ..	− 2·6 ,,
Air = ..	− 1 ,, ..	− 2·7 ,,

These figures are well worth bearing in mind—that the gas is being sold by volume.

There is no doubt that, by filling up the horizontal retort, the coke made is of better quality—being more dense, harder, and of better colour; and much less breeze is produced. Especially is this the case with coals that produce a soft, friable coke.

There is a decided increase in the quantity of ammonia recovered—due largely, I believe, to less disassociation taking place in the retorts.

If ammonia is subjected to a temperature of 500° C., 1·6 per cent. by volume is decomposed. If the temperature is increased to 600° C., then 18½ per cent. is decomposed; and at 700° C., one-half of it by volume is split up when passed through a heated tube. No doubt this rate of decomposition is retarded by the mixture of the other gases present, as the ammonia seldom if ever exceeds 1 per cent. by volume—the quantity generally being from 0·5 to 0·95 per cent. by volume.

In our own case—due largely, I believe, to filling up the retorts—we have during the past three months sold just over 28½ lbs. of sulphate of ammonia (centrifugal dried) per ton of coal carbonized, which is very much higher than was obtained when we were working five-hour or six-hour charges.

I find the space above the coal in the retorts—⌂ section, 22 in. by 16 in., which is the size at our Litchurch works—is as follows:

8 cwt. charges	8½ inches.
10 ,, ,, ...	7 ,,
12 ,, ,, ...	5½ ,,
14 ,, ,, ...	3⅞ ,,

And from these figures, I calculate the average velocity of the gas travelling in the free space above the coal in the retorts:

8 cwt. charges, 8 hours	9 feet per minute.
10 ,, ,, 10 ,, ...	12 ,, ,,
12 ,, ,, 12 ,, ...	17 ,, ,,
14 ,, ,, 14 ,, ...	31 ,, ,,

The result of this increased velocity of travel of the gases inside the retorts, along with probably a lower average temperature of the coal carbonized, due to the increased thickness of charge, is indicated by the average temperature of the issuing gases at the bottom of the ascension pipe, at a point 1-inch above the socket of the mouthpiece, taken by means of a standard (nitrogen filled) direct-reading mercurial thermometer:

For 8 cwt. charges, the average is	885° Fahr.
10 ,, ,, ,,	,, 709° ,,
12 ,, ,, ,,	,, 617° ,,
14 ,, ,, ,,	,, 451° ,,

The temperatures on the furnace side are, on the average, 150° hotter than on the other side. The average temperature of the gases coming away from an 8-cwt. charge is almost double that of a 14-cwt. charge. Thus it will be evident that decomposition and chemical changes take place in a much greater degree with the lighter charges of shorter duration.

Coal gas is not diathermic. It readily absorbs radiant heat, and is easily heated by conduction, which shows that, although the temperature of the gas at the bottom of the ascension pipes is (say) for twelve-hour charges an average of 600° Fahr., at the dip-pipes, before entering the hydraulic main, it is generally only 120° to 130° Fahr.—cooling no less than 480° in 22 feet.

This very much lower temperature of the gases entering the ascension pipes no doubt accounts for the freedom from stopped pipes which is the general experience of all who have adopted heavier charges with a correspondingly longer period of carbonization.

Another very important matter is that with filled retorts the sulphur compounds (CS_2), which are so difficult to deal with, are much less than with light charges.

The tar produced is very much thinner—the specific gravity coming down (in round figures) from 1·200 to 1·100.

The naphthalene present in the purified gas is now less than it used to be; this reduction being due to filling up the retorts with longer period of carbonization.

We must thank the Clay Cross Company for laying before us the results of their working. I do not think that in England there is much hope for coke-oven gas being distributed, unless the towns happen to be pretty near the collieries.

Discussion.

Mr. W. A. Sapey (Tamworth) remarked that they had heard a lot of technical discussion on retorts and carbonization; but he should still like to ask a few questions in regard to the matter. A few years back at his works they had direct settings of retorts, and they decided, when modernizing their plant, to still keep to horizontal retorts. With these horizontal retorts they could make between 9000 and 10,000 cubic feet of gas per mouthpiece. After listening to all they had heard that day, he could not see where the advantage would come in of making any change in the case of small gas-works. For instance, Mr. Bell talked about having full retorts. In a works of his (Mr. Sapey's) size, this was impossible unless they had machinery. With horizontal retorts, Mr. Langford was making 12,900 cubic feet, and selling 12,100. In view of these figures, he (as representing a 50 million cubic feet works) would like to know where would be the advantage of making a change from horizontal working. According to a certain advertisement in the "Journal of Gas Lighting," the largest make in the country was from horizontal retort working. In view of this, where did the vertical retort, continuous or otherwise, come in? He had his retorts filled as much as possible by hand labour; but when they had 5 or 6 cwt. of coke to pull out, the men had something to say about it. Without machinery, it was impossible for small works to get the results that were heard of from the larger works.

Dr. Rudolf Lessing (London), invited by the President, said he did not know, after what they had heard from two practical men, that he had any remarks to offer that would be of value. In his opinion, the gas industry might be congratulated upon the state of affairs in connection with the question of carbonizing at the present moment. There was certainly to-day no danger that things in this respect would again drop into a groove—the protagonists of the various carbonizing systems would see to that. He thought it might be taken that the gas profession would not accept to-day any one system of carbonization; and they now brought their experiences and beliefs as derived from their practices to bear against each other—certainly to the benefit of the industry as a whole. There was no doubt whatever that the advent of the vertical retort had had a lot to do with the developments, during the last four or five years, in carbonization for gas making. If the vertical retort had only demonstrated the advisability of heavy charges, or full or practically full charges, in horizontal retorts, it had done something beneficial. This was a great point in the cause of progress. From the theoretical point of view, it could not be doubted that the vertical retort, and especially the continuous vertical retort, was the right thing. On the other hand, it had to be considered that there were conditions, such as were mentioned by the last speaker, due to the size of the works, and conditions, too, relating either to the capitalized value of the older works or to the cost of the newer carbonization systems, that would compel adherence to the old system of horizontal retorts. The rehabilitation of the horizontal retort in favour had been made possible by the vast improvements that had taken place during the last few years in charging machinery; but giving all credit to the improvements in charging machinery, he must hold that to the pioneers of the vertical retort was due the merit of having demonstrated how it was possible to make better use of the horizontal retort. When they heard such excellent results as those Mr. Bell had put before them, both now and in his Institution paper last year, it was impossible to avoid the conclusion that it would take a very good system to beat these results. As to intermittent or continuous vertical charges, the theory was, as he had said, in favour of the latter. The progress that had been made in Germany with the intermittent system was hardly due to the superiority of the system as such, but to the way the question was tackled over there; and to the attention, the energy, the money, and the skill bestowed upon the working out of the details of the system. Then as to the continuous practice, whether it would be the Woodall-Duckham system or the Glover-West, or the semi-continuous retort (of which he had reason to believe they would hear more at the next meeting of the Institution from the President, Mr. Alexander Wilson), that would hold its own in the matter of superiority, remained to be seen. It might be that success would favour the semi-continuous one, in which the retort was working on a continuous principle, without any mechanical appliances, which were not desirable things in a plant that had to be kept at high temperatures. One could do away with these things by merely working the continuous system as it were intermittently—that was to say, by partially charging and discharging by hand so many times per shift. As he had already remarked, it was not possible at the present juncture to decide which of the systems was the best. The "best" depended upon the soundness of the system from both the engineering and the chemical points of view; and as to how it was handled and worked. What had occurred in the case of the horizontal retort only showed what proper handling and skilful working could do in the matter of enhancing results. So much for carbonization generally. They had to discuss, also, the paper read that day on coke-oven practice, and its bearing on the gas-supply industry; but he might discourse at great length on some of the problems connected with large space carbonization in chambers and in coke-ovens, because exactly the same condition of affairs prevailed in the working of coke-ovens as it did in the working of large retorts or chambers. The horizontal ovens were the usual ones in nearly every country; they had also the newer vertical ovens, and they were well on the way to the continuous vertical oven. There was also the inclined oven for gas-works. He believed the principles underlying these were practically the same, with qualifications of course, as those obtaining in the case of retorts. With regard to the question of supplying gas from coke-ovens to gas-works, this was more or less an economical matter. Technically, he thought there was no difference in the gas made in coke-ovens (that was when made as it should be made) and in gas-works. The only fundamental difference was that the coke-oven manager had to direct his attention to the making of good coke as well as the saleable bye-products, whereas the gas

manager must of necessity (he was forced to do so by his statutory obligations) devote his skill and attention chiefly to the gas part of his product. The question of utilizing coke-oven gas had been tackled to a very large degree on the other side of the Atlantic (he believed the Americans were the first to take advantage of it) in every branch of possible application, so that it was comparatively easy for them to purchase the gas wholesale from the coke-oven plants. In Westphalia, too, residual plants had been adapted in their practice. The procedure followed there was to take the rich gas that came off during the first period of distillation, and divert it into the gas-supply channel, while the poor gas, on the other hand, was used for heating the ovens. He was glad to find that, in this country, things were moving in this direction also. They had in the present session of Parliament a scheme promoted for utilizing gas for town lighting from the coke plant of the Earl of Ellesmere at Little Hulton; and, as Mr. Lucking demonstrated to them, this had been done already, with fair commercial success, elsewhere. The question of the stoppage of coke-ovens through miners' disputes and other labour difficulties, and consequent interference with the gas supply, was a serious one; and therefore before any scheme was adopted, there must be absolute certainty that the use of the gas as an economic factor would not be interfered with. There was one little matter that struck him some time ago; but it could hardly be called utilization of gas, because the quantity of gas required for it would have scarcely any bearing on the output of either gas-works or coke-ovens. In connection with the early endeavours in relation to air-ships, some two or three years ago, he thought it might be a good thing to follow on the production of gas as now made with the decomposing of the succeeding gas, so far as it was decomposable—that was to say, crack the gas up into hydrogen, with the small impurities of nitrogen and carbon monoxide, and make a gas suitable for filling air-ships and balloons. It would, from a strategic point of view, be desirable to have a large number of stations distributed all over the country from which the military air-ships could draw their supply. The question would be less one of the purity of the gas than the convenience of the supply and utility. He had obtained protection for one device by which such a gas could be made, though he did not expect a great commercial value from it.

Mr. T. Berridge (Leamington) remarked, regarding the rivalry of the vertical retorts, chamber settings, and horizontal retorts, that he did not think it could be said that one system was better than the other. In connection with all these processes, what they had first to consider was their individual conditions, and how a certain type of setting could be adapted to meet their own particular needs. They were grateful to Mr. Bell, Mr. Glover, and others, who were pioneers in the working of different systems, for the experiences and hints with which they had from time to time favoured them. In several of the small works with which he was connected, they were getting results as good as the best he had yet seen. In one or two of these works, they were making over 13,000 cubic feet per ton of coal, and were actually getting paid for over 12,000, and that a good 15½-candle gas. What they did was to charge the retorts all at once. They also had an apparatus in the retort-house, so that they could easily alter the retort-house governor, and give variations in the pull (there was a jet photometer against the apparatus regulating the pull, which was reduced as the jet photometer went down) to maintain the jet photometer at a proper point. They were enabled to work 2 inches pull immediately they had charged the retorts, 1 inch in an hour's time, ½ inch in two hours' time, and a level gauge during the other portion of the charge. Anybody in charge of small works who worked in this way, and without any seal, could make 13,000 cubic feet of gas per ton. With reference to the filling of retorts, of course, in a large works they could not watch the pull so well as in small ones. When he adopted charging machinery, he started with eight-hour charging and 10 cwt. charges; and he soon found that, without any seal, the main began to pitch-up and the ascension-pipes to choke. It looked like coming to a standstill. But he telephoned to Mr. Bell; and his advice was to go on to twelve-hour charges and put on ½-inch seal. He was quite right; and the mains stopped pitching and the ascensions stopped choking. They began to make 12,000 cubic feet of a higher illuminating power gas, and so were able to do away with cannel, while simultaneously making a very good coke. Recently they had put in some of Mr. Thomas Glover's chamber-retorts; and they were going to work very well.

Dr. W. B. Davidson (Birmingham) said he should like, in the first place, to ask Mr. Glover whether he could, by any system of retorting practice, produce a coke which was at the same time porous and light and suitable for domestic purposes and, by making perhaps some slight alteration, obtain a coke suitable for metallurgical purposes. He (Dr. Davidson) did not think it was possible. Mr. Glover seemed to him to be a bit of an idealist. They were all idealists in a sense; and certainly most of them would no doubt favour a project of British enterprise and genius in making a selection of a retorting system. What he wished to point out clearly, if he could, was that in using heavy charges—although they might have the advantage of doing away with stopped pipes, getting a thinner tar, realizing a better coke, possibly reducing the fuel used, and most of all diminishing labour costs—they never got, in his experience, nor in that of Mr. Bell, a better yield of gas. It was quite a misconception to think they did. He considered it was a very common delusion that, with heavy charges, they increased the capacity for gas making of the retort-house. He was strongly of opinion that the yield of gas depended on the size of the retort and on the temperature; and beyond a certain limit one could not go. In other words, there was a limit beyond which one could not do better with heavier charges than with moderately light ones. He found this with their test plant in Birmingham. They could carbonize 26 cwt. per 24 hours, but not more, at a temperature of 1900° to 2000° Fahr. If he carbonized 9 to 12 cwt., he got no better results; and Mr. Bell's own figures of last year and this year proved just the same thing. It had often been stated that certain results were wonderful, and that an increase (say) of 20 to 30 per cent. in gas was obtained. He thought this was distinctly erroneous. Mr. Bell reminded him that there might be a considerable increase in the calorific value. Taking the gas production on the calorific basis, certainly this had been found on large-scale experiments. The question of carbonizing was a very puzzling one. Slight differences in the size and shape of retorts made a large difference in results. He knew of one retort-house where the charges were 9½ cwt., and they were burned off in eight hours in large retorts. In this case, the sulphur compounds were 50 per cent. more than they were in smaller retorts carbonizing 6½ cwt. in six hours. It was a remarkable difference. Dr. Lessing had said that theoretically the continuous system of retorting was the best. Most of them he imagined would say so. For his own part, he had been looking into the matter; and considering Dr. Bueb's own statements, he found that, in verticals as a whole (this applied to continuous as well as to intermittent retorts), there was a loss of the gas production on the illuminating power basis, due to the scrubbing of the gas by the red-hot coke. Of course, in the continuous system, most of the gas was given off at the top of the retort, and this portion was not scrubbed by the hot coke. But, as Mr. Harris had pointed out, carbonization was not completed until the coal got nearly to the bottom of the retort; so that a large portion of the gas must get scrubbed, and this was prejudicial to the hydrocarbons. He believed it was pretty well admitted now that vertical retorts were not very successful on the illuminating power basis. The great secret of success in carbonizing was burning off completely, and this was what was done especially well in the Dessau vertical retort. The coal was carbonized very thoroughly; and towards the end of the period of carbonization, there was exceedingly little volatile matter left in the coke. It was very misleading nowadays to bring up old carbonizing results to prove that this or that system had been a great success, because he could affirm, from their own experience in Birmingham, that they could increase the gas production by at least 15 per cent. by simply getting proper retort temperatures, and making no other alteration at all. In his opinion, the matter of retort temperatures was one that had been much neglected by most gas engineers. He should like to point out, with regard to the figures in the analysis of the gas given by Mr. Lucking, that the 13 per cent. of nitrogen illustrated what was regarded by the advocates of the vertical retort system as a serious blemish of the chamber oven retorting system. It was said, and he thought with truth, that chamber ovens were more liable to leakage, and that the large increases of gas which were given, and the results educed, were due to the introduction of furnace gases or waste gas. The other day he had an experience with retorts which were not properly covered with scurf, and were working with a level gauge, or certainly less than 1-10th inch pull. He got 23 per cent. of nitrogen and 6 per cent. of carbonic acid—that was to say, over 29 per cent. of the total gas was really furnace gas.

Mr. Harold E. Copp (West Bromwich) congratulated Mr. Harris on his paper. When one got hold of a new idea, and read a paper on it, one was apt to take a rosy view of it, and try to convince his hearers that the millennium had been reached. Mr. Harris did not do this. He gave straightforward experiences, and recounted his failures, as well as his successes. Mr. Harris mentioned two objections to the continuous vertical system; and he (Mr. Copp) was rather surprised to find that Mr. Glover had not taken notice of the points. The author said that separate charging and discharging mechanism was necessary. That was clearly not so in the Glover-West system, in which there was no charging machinery. Then Mr. Harris also thought that the continuous movement of the coke in the retort would have a breaking effect on the coke. This could not be so, as surely the coke must move as it were in the mass. At the end of the paper, Mr. Harris said most of the improvements that had been made were, in his opinion, due to the better conditions allowing free and steady passage of gas from retorts. He (Mr. Copp) thought this statement hit the nail on the head; that it was the *crux* of the whole thing. In the last issue of the "Journal," there was a leading article, in which some interesting particulars were given as to how much less coal was carbonized by statutory gas undertakings in the last year covered by the Board of Trade returns compared with the previous one. Some 12,446 tons of coal less were carbonized (though there had been an addition to the undertakings making returns), and no less than 63,066,000 cubic feet more gas were made. He (Mr. Copp) would like to know how much of this was due to improvements in carbonizing, and how much to the increased facilities granted by Parliament. Dr. Davidson had remarked that to quote make per ton without referring to illuminating power was a vanity. He did not exactly use these words; but that was what he meant. He quite agreed with him. In the works for which he (Mr. Copp) was responsible, he succeeded in realizing something approaching the results obtained by Mr. Bell. But unfortunately he had to supply gas of

an illuminating power some 4 candles higher than the majority of the undertakings in this country. If they made a simple rule of proportion sum, and calculated a make of 11,500 cubic feet to the ton at 4 candles higher than the great majority of gas undertakings in the country were supplying, he thought it would be found that he was approaching some of the best results obtained in vertical retort working. Furthermore, with heavy charges, by discharging the coke in closed vessels and slacking it in closed vessels, and preventing any access of air to the coke, he produced a coke very nearly as good as that exhibited by Mr. Glover.

Mr. W. J. R. Baker (Great Malvern) congratulated Mr. Harris on his spirited work with Love's 45° retorts. He was rather sorry the author had only 11 feet retorts in comparison with the usual 20 feet ones. But working out the figures, with his 11 feet retorts he got 8606 cubic feet per retort, which was equivalent to 15,740 cubic feet with 20-feet retorts. In his own case, he obtained 17,500 cubic feet. Another point was that Mr. Harris had tried five charges per 24 hours. He (Mr. Baker) had also tried this number, but not with the same success as with four charges. He had also tried filling the retorts, but was limited by his charging apparatus to 7 cwt. charges. He agreed with Mr. Glover that, if the bull's eye were taken out where it existed, better results would be obtained; and he would further say this, that the sooner they all got their results on to a common basis with calorific power, the better both for the profession and for outsiders. They were apt to hear of so much per ton being obtained from this and the other works, with the result that the outsider or the committee man took it as the ground on which to compliment or condemn the gas engineer of the particular undertaking in which he was concerned. It would be a good thing if they could get some concordant experiments made with hortizontals, verticals, inclines, and Love's 45's. This would enable them better to judge of whether they should go to horizontals with machinery, to inclines, or to those "drawing-room like" conditions of which Mr. Glover had spoken with verticals. They could with the proper information before them see which would best suit the conditions of their particular works.

Mr. W. W. Townsend (Hereford) said there seemed to be no doubt that a greater yield of gas was obtained from fully-charged retorts, whether horizontal or vertical, compared with partially filled ones. The usual explanation was that, with the filled retorts, the constituents of the gas were not cracked-up by contact with the heated surface of the retort, or exposed to the radiant heat of the free space above the charge. But if this were so, how could the increased yield be accounted for? A greater volume of gas was obtained by decomposing the hydrocarbons into hydrogen and carbon; and the fact that with filled retorts the yield was greater, and the illuminating power lower, appeared to indicate that the gas had been cracked-up to a greater extent than it was with light charges. It seemed to him that the probable explanation was that, with fully-charged retorts, it became possible to work with higher heats and to crack-up the gas to a greater extent, because the temperature of carbonization with light charges was limited by practical considerations—the trouble of choked pipes and pitched mains being the principal. With full charges, on the other hand, it became possible to carbonize at a much higher temperature, because the carbon set free by decomposition of the hydrocarbons was filtered out of the gas in its passage through the coke—thus improving the appearance and quality of the latter. He should be glad if the author or other speakers could throw any light on this subject.

Mr. Baker further asked whether, after his longer experience, Mr. Harris had had any additional trouble with the discharge of Love's 45's.

Mr. F. J. Ward (Knowle) said he had quite lately gone into the question of large charges; and there was no doubt that with some coals they were a great advantage. They were not so with all. Taking Derbyshire coal, for instance, heavy charges were a considerable advantage. The coke was much harder and firmer, the tar was thinner, and the ascension-pipes were always clear. Taking the case of a heavy Yorkshire—a (so to speak) fat—coal, the results were not nearly so good. He could produce more gas per ton of coal with a medium charge of Yorkshire coal than he could with a large charge. With Derbyshire coal, he could produce more with the large charge. One speaker had said that it was possible in small works to produce 13,000 cubic feet of gas per ton of coal carbonized. He (Mr. Ward) could bear that out. For the last six months, he had produced 13,000 cubic feet per ton, and of such a quality that his consumers were perfectly satisfied, and so was he. The quality tested by a jet photometer—which some people said was unreliable [laughter]—was about 15 candles; and the calorific value was 530 B.Th.U. net. He could produce this regularly. Then another speaker mentioned the difficulty of hand-drawing retorts heavily charged. He (Mr. Ward) confessed that it appeared to be hard work; but, in reality, it was not so. When they took the hundredweights of coal carbonized, the expenditure of power incurred was not more than it was in the case of smaller charges. He himself stoked on a great many days, and so knew of what he was speaking. And he was prepared to say there was no more expenditure of power taking it per hundredweight of coal carbonized. In gas-works of his size, making only 10 millions per year, machinery was out of the question. It was his intention to still go on with large charges when he was using coal such as Derbyshire; but when using Yorkshire, he altered his system. With retorts 21 in. by 15 in. by 8 ft. 3 in., he put in 4½ cwt. charges, and produced 13,000 cubic feet of gas per ton. He might also say that he had adopted an arrangement of anti-dips. He had broken the top pipe in the centre, and allowed the bottom portion to drop away during the time the gas was being evolved from the coal.

Mr. A. J. Harrison (Padiham) said, as some of the members were no doubt aware, they had lately opened new gas-works at Padiham; and inclined retorts had been installed. But according to some of the speakers, it would appear they had taken the wrong course in doing so. They were eighteen months considering what type of retorts they should put down. He could say that, after three weeks' working (which, of course, was not long), he was perfectly satisfied with the results he was getting from the inclines. It was a question whether it was possible to instal vertical retorts economically on a works making under 100 million cubic feet per annum. If it were possible, were the better results claimed for the verticals going to meet the extra capital charges over and above the inclined or the horizontal system? He took it for granted it was also impossible to put in horizontals and machinery in a works making under 100 million feet per annum. There was just one other point that had often struck him. They heard much about heavy makes, but they heard nothing at all about what gas was being sold. Was the proportion of gas sold through the consumers' meters in the same ratio as the increase in make? He found from published analyses that probably 90 per cent. of gas where it was cheapest in the holders was from low yields per ton. It was an open question whether the extra make above 11,500 cubic feet was really worth the candle. He should like some idea as to what was the minimum make that would allow of horizontals with charging machinery or verticals being installed in any particular works.

Mr. W. C. Jones (Brierley Hill) inquired whether anyone could inform him as to the cost of repairs and upkeep of vertical retorts, together with the cost of installation, for gas-works with a make of 100 millions per annum. One question Mr. Harrison had asked was if the sales of gas through the consumers' meters had any relation to the increased make. He (Mr. Jones) might say that for six years his make had averaged 12,500 cubic feet, with a calorific value of 550 B.Th.U.; and their sales per ton had increased at a greater ratio. Of course, everybody knew that the loss of gas in Brierley Hill was heavy, owing to subterranean workings; but it was now at a point to which they never hoped to get it a few years ago. It was under 10 per cent.

The President said the discussion had travelled widely over the field of carbonization; and he was sure the report of it would be read with great interest. It had been a discussion that would bear comparison with any that had taken place at a District Association meeting for some considerable time past.

Mr. Glover asked whether he might be allowed to speak first in reply to the discussion, as he desired to leave early in order to catch his train home.

Mr. Harris said, before Mr. Glover replied, there were one or two points to which he desired to refer. Mr. Glover had spoken of uneven heating; but if he read the paper carefully, he would see that he (Mr. Harris) said that now that the centre retort had been cleared out, he did get even heating. But they were not able to carbonize so much coal in the bottom retorts as in the upper tiers; whereas in probably nineteen out of twenty horizontal settings, if they took the charge out immediately it was burnt off, it would be found that they were able to carbonize more coal in the bottom retorts than in the middle tier. He saw no reason why, when he reset his retorts, he should not get equal heating throughout. He was sorry they had not learned more about the vertical retorts from Mr. Glover, who had spoken in such a strain that they could almost fancy they were in dreamland. [Laughter.] Certainly they had had nothing to the point. He (Mr. Harris) had raised several questions in his paper as to pressure, formation of carbon, and other matters, and had hoped they would have had a little information on these points.

Mr. S. Glover said he did not come to the meeting to read a paper on vertical retorts; but he could promise Mr. Harris and everybody else who was looking for further information that they should have it, and that presently. Mr. Bell had suggested that the German system of vertical retorts was at the bottom of the English system of continuous working in vertical retorts. He (Mr. Glover) should like to correct that, because the English system of continuously operating vertical retorts was being worked at long before the German system was anything like the success that it was at present—so far as it had attained a measure of success—in carbonizing gas coals.

Mr. Bell: Was that for gas making?

Mr. Glover: Yes. He did not think that either Messrs. Woodall and Duckham or anyone else would allow that they were inspired to develop the English system by what the German workers had done, because those who had studied both systems held that the German system did not suit the ideas, or the needs, of the English gas engineer, who had to produce a good illuminating quality of gas. Dr. Lessing contended that the horizontal retorts still held the field. He (Mr. Glover) was much puzzled to know which field it held. He also remarked that it was still possible, if horizontal retorts were properly handled and skilfully worked, to get a good duty from them. Horizontal retorts held the field in numbers; but he did not think the large percentage of them would do so for any long time. The continuous vertical system was the one that would hold the field in future, and that in an increasingly larger degree as each year went by. There appeared to be some slight misconception on

Dr. Lessing's part as to the discharge of coke from the Glover-West system. The discharging of the coke was continuous into the bottom hopper; and it was only the releasing of the hopper door to allow the coke to drop out that was done at intervals. Dr. Davidson honoured him by speaking of him as an idealist. He accepted it as an honour; for surely the gas-engineering profession needed its idealists. Dr. Davidson asked whether he could at the same time produce a porous soft coke and a hard dense coke. He thought Dr. Davidson had asked him to do something that he must disclaim to be able to do. But he did claim that they had, in their continuous system, manufactured a coke which was valuable for use for both domestic purposes and in some manufacturing operations; and it was much sought after. They had heard about the results that had been obtained from full horizontal retorts. Those who were getting them were inclined to forget the days through which they had come; they forgot that the horizontal retorts had not been making the gas they could have done had they been differently charged. There had been a great deal of decomposition of the gaseous and the liquid hydrocarbons that had not been recorded either on the station meters or the consumers' meters, or in the gallons of liquid hydrocarbons sold to the tar distiller. The value of any carbonizing process was not fully gauged until the liquid products were taken into account. The continuous vertical retort gave a higher candle-foot value per ton of coal carbonized than any other system; and that was the ultimate point at which they had to look. If they took the quantity of gas and the illuminating power, and multiplied it together, they got a total higher result by their continuous system than by any other. It was possible that the radiant heat part of a horizontal retort might be at just the right point when it came to the question of high illuminating power per ton of coal carbonized. But the proportion of radiant heat in an unevenly charged retort was likely to be excessive; and in a partially charged retort, the radiant heat might be too much. This would lead to irregular results. It was quite possible that vertical retorts could be adapted to works of 100 million cubic feet capacity—in fact, the possibility of doing this had actually come about at the present time. The cost of repairs for continuously worked vertical retorts would surely be less than in any other system, because the retort did not carry the charge, and it had not the burden of any charging or discharging machinery. It would also last longer than any other system of retorts, because of being continuously charged and so continuously heated at the proper temperatures, which was not the case where violent changes were produced by dumping coal into intermittently charged retorts.

Mr. HARRIS, in reply, said Mr. Glover had referred to the question of uneven heating and irregular charges. He ventured to say these were conditions that did not obtain in the majority of works to-day. It was an easy matter to keep horizontal retorts evenly heated throughout; and if they had stopped ascension-pipes, it was due to local circumstances, and not to the fault of the carbonizing system. With reference to Mr. Bell's remarks, he suggested that he (Mr. Harris) could overcome the difficulty of back-pressure by grading the coal. It was purely a question of the character of the coal. Mr. Ward, in his experiences with light and heavy charges in horizontals, had hit the nail on the head with regard to the trouble with back-pressure in the bottom of the vertical retorts, when he said that, in using Derbyshire coal, he had no difficulty in working heavy charges, but when using rich Yorkshire coal he did experience difficulty; and he found it was not to his advantage to continue heavy charges with the latter. The conditions of the intermittent vertical retort were such that, with a certain class of coal, they might always be subject at some period or other of the charge to back-pressure in the lower mouthpiece. During the earlier part of the charge, they had a central core through which the gas would travel; but when the core became fluxed, there was no other outlet than through the incandescent coke itself. He was of opinion that certain coals would never lend themselves to carbonization in intermittent vertical retorts. He thought Mr. Bell had explained this, when he said that he had done better in his horizontal retorts by leaving a little space over the top of the charge. With regard to his (Mr. Harris's) severe strictures of vertical retorts, they were honest; and the reason he put his view in plain language was to try to elucidate by discussion facts which were not in their possession to-day. Mr. Bell said that any of the systems were best under certain conditions. He agreed with him. But he was in exactly the same position as before he read his paper. It was all like a Chinese puzzle; and he did not know which was the right system and which the wrong. With regard to the increased yield of ammonia, he was glad to say that he had felt a benefit in this direction. There was no doubt there was a larger yield of ammonia with heavy charges as compared with light ones. Mr. Berridge had given them some figures which would set them all thinking; but he did not fancy it would be practicable to carry out his idea of charging the retorts all at once, except in very small works. He was extremely obliged to Mr. Copp for his remarks; and as to Mr. Baker's question regarding the discharge of the retorts, he did not, from his additional experience, think there would be any more trouble after longer use than now in running down the charges. Mr. Townsend had asked a question as to the results obtained from heavy charges; but he thought Mr. Townsend had at the same time answered himself.

Mr. LUCKING said there was really nothing for him to reply to. He had given his little experience as to the use of surplus gas from coke-ovens, as he thought it would be of interest to the members. He happened to know of a company who were going in for a Provisional Order in connection with the supply of coke-oven gas; and it was made a condition that the company should take the whole of the surplus gas and pay 1s. 6d. per 1000 cubic feet for it. He did not know whether his experience would stop any other brother gas manager from doing anything of this kind. If it did, he should be satisfied his paper had been useful.

Mr. BELL said, with reference to the criticism of Mr. Glover, he was glad to know, on the authority of Dr. Lessing, that Messrs. Woodall and Duckham were among the first in connection with the pioneering work associated with the vertical retorts. He had been under the impression that their German friends were the first. But it was not a matter of great importance, because, if they were not the first, they had been the means of bringing verticals to great success, and, in doing so, had exercised much technical skill. Therefore they were indebted to them for bringing these retorts forward. One gentleman had asked the size of works in which they could introduce machinery. In considering this matter, they had to take into account the local conditions of the works before arriving at any conclusion. Dr. Davidson had referred to the yield of gas with heavy charges. He (Mr. Bell) had never claimed that if the cubic feet were multiplied by the candle power there would be a larger product; but if they multiplied the cubic feet by the calorific value, they did get a valuable result from the use of heavier coal charges. The heavier charges had enabled them to get a higher make of gas per ton of coal carbonized of 14 to 16 candle power gas tested by the "Metropolitan" No. 2 burner; and such a gas was the most suitable for general distribution. With inverted burners, he had found that gas of higher illuminating power was rather prejudicial than beneficial. He was glad indeed to see Mr. Ward present giving experiences from his own practical work. Those who did retort-house work themselves were the ones who could speak with greater authority than those who merely went into the retort-house from time to time and looked on.

The PRESIDENT moved a vote of thanks to Mr. Harris and Mr. Lucking for their instructive papers.

Mr. BERRIDGE seconded the motion, and it was heartily passed.

Mr. HARRIS replied on behalf of the authors.

Calculating the Hydraulic Modulus in Portland Cement.

In the "JOURNAL" for the 30th of August, it was mentioned that the British Standards Committee had recently published a revised specification for portland cement. It is laid down therein that the proportion of lime to silica and alumina shall not exceed 2·85 per cent., with a minimum of 2 per cent. The calculation of this ratio from the analysis is a somewhat elaborate process, occupying from five to ten minutes, according to the experience and the skill of the calculator. With the view of obviating this labour, and ascertaining at a glance whether or not the chemical composition of a portland cement comes within the limits of safety prescribed by the specification, Mr. D. B. Butler, Assoc. M.Inst.C.E., F.C.S., who is at the head of the well-known firm of Henry Faija and Co., has arranged, in conjunction with his former Chief Chemist (Mr. G. J. Fenwick), a diagram, by the use of which the determination can, it is claimed, be made in the short space of fifteen seconds. The diagram, of which Mr. Butler has sent us a copy, is ruled off with the percentages of lime and silica as ordinates and abscissæ respectively; the former being on a sliding-scale beneath the latter. All that is necessary to determine the hydraulic modulus in cement is to move the zero of the sliding-scale to correspond exactly with the percentage of silica, and, at the point where the vertical line above intersects the horizontal line corresponding to the percentage of lime, follow an oblique line on the diagram upwards to the right, and the required percentage will be found at the top. It will thus be seen that no chemical knowledge is required—that, in fact, the diagram, being based on the slide-rule method, can be used by an ordinary clerk. It is mounted on stiff cardboard (22 in. by 17 in.), and published by Messrs. John J. Griffin and Sons, Limited, of Kingsway, W.C., at the price of 2s. 6d. net.

Corrosion of Cast-Iron Pipes by Fresh Water.—In the course of a paper by Mr. T. Steel, read at a meeting of the Sydney Section of the Society of Chemical Industry, and given in the current issue of the Society's "Journal," he mentioned a case of cast-iron pipes becoming badly corroded by the action of fresh water. The pipes were those of an ordinary Green economizer—an arrangement of cast-iron pipes placed in a boiler flue for the purpose of heating water by means of the waste heat of the furnace gases. These pipes, within a moderate number of months of their installation, became greatly corroded—so much so that only a thin outer shell remained. The inner part of the metal had become transformed into a thick layer of plumbago-like material, easily separated from the unaltered iron. Originally the pipes were $\frac{1}{2}$ inch in thickness. When removed, owing to their giving way, the residual shell varied from $\frac{3}{16}$ inch to less than $\frac{1}{16}$ inch; while the layer of altered metal was about $\frac{3}{8}$ inch. The water while being heated was under boiler pressure—about 60 lbs. per square inch; and its temperature would vary from about 60° Fahr. on entering to 300° Fahr. on leaving. There was no noticeable difference in the degree of corrosion of the pipes due to this range of temperature.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

A Gas Exhibition, and an Address by Mr. Stanley H. Jones.

There was a large attendance of members and friends at the opening meeting of the London and Southern District Junior Gas Association for the present session, which took place on Saturday at the new meeting-place—the Westminster Technical Institute, Vincent Square, S.W. The programme was a comprehensive one; and those who arrived at three o'clock in the afternoon and remained until ten at night, found that they had none too much time to see all that there was to be seen and hear all that there was to be heard. The features of the meeting (which was held in the large lecture hall) were an extensive exhibition of gas appliances and scientific apparatus in connection with the industry, an address by Mr. Stanley H. Jones, and various practical demonstrations. These latter were: Gaslight and Coke Company's Apprentices at Benches, Mr. P. J. Smithers; Calorimetry, Mr. J. G. Clark; Laboratory Experiments, Mr. J. H. Singleton (Messrs. Fletcher, Russell, and Co.); Lacquering and Metal Colouring, Messrs. W. Canning and Co.; Microscopical Comparisons between the Flora of Coal Measures, Past and Present, Mr. H. Austin. Microscopes were lent by Mr. Clark and Mr. Austin; and the former gentleman also showed and explained other scientific apparatus. There were excellent specimens on view of the apprentices' work after twelve months' workshop training. The material needs of visitors were amply catered for; and the President (Mr. L. F. Tooth), the Council, as well as the Organizers of the meeting (Messrs. H. Rothwell and P. J. Smithers) are to be congratulated on the complete success of the programme in every particular.

The Westminster Technical Institute is becoming quite a large centre for the educational side of the gas industry. Messrs. Rothwell, Smithers, Bevis, and Coghill take an elementary practical class there three nights a week, and the pupils number 150; while Mr. J. G. Clark is giving two lectures a week in the higher grade, to a class which includes about 35 names. There is an excellently equipped laboratory in connection with Mr. Clark's course, where calorimeters, photometers, and other necessary apparatus, can be used under proper conditions. Mr. Clark makes a great point of what he alludes to as "utility" calorimeters—instruments which show the actual usefulness of different appliances to the gas consumer. The radiation calorimeters for testing gas-fires and grillers which Mr. Clark described in his paper before the Association last April were carefully inspected by the visitors, as well as a number of other appliances.

THE EXHIBITION.

There was really so much to see in the exhibition, that even after a careful inspection it was impossible to be sure that one had not missed something; and therefore should anything interesting that was on view not be mentioned here, the omission, it will be understood, is not from design, but by accident. It was obvious that an immense amount of labour must have been entailed in getting everything arranged; but if the trouble taken was great, the result achieved was great also.

In glancing at the exhibits, it is, perhaps, fitting that the lighting department should be dealt with first—if only for the reason that before reaching the building the eye was caught by a large Chipperfield intensified gas-lamp which was lighting up the entrance. Then on going up a few steps, it was seen that the staircase was lighted by Messrs. Thomas Glover and R. & A. Main with one of the Glover high-pressure inverted burners, with which the makers have secured an illuminating power of 65 candles per cubic foot testing with Tottenham 14-candle power gas. The burner was in operation without the aid of any lamp casing whatever. The firm also had on view samples of meters, "D. S. O." fires, and numerous models of cooking and heating appliances for restaurants, &c., together with a Woodall-Moon mantle shocker and Jones's naphthalene force pump. The James Keith and Blackman Company had fitted up an electrically driven compressor connected with 1500-candle lamps which lighted the hall; and Messrs. W. Sugg and Co. also showed in action high-pressure lamps and a hot-air engine compressor. Both firms, in addition, displayed numerous other of their specialities.

There were tasty little groups of Bland lights about the exhibition, among the many varieties of smaller lights that were in action. The Crown Lamp Company, too, were well represented with inverted burner lamps, &c.; and special attention was drawn to their "Briton" globe holder, which automatically fastens the globe, holding it securely in position without pinching it. There are three spring clips in the gallery; and by merely raising the globe into its proper position, these clutch it under the rim. To take out the globe, all that has to be done is to raise one of the clips. The firm's lamps are fitted with simple and easily adjusted air and gas regulating arrangements; and another feature is a dust-trap, with which all are provided. In the "Liliput" lamp, the light is entirely enclosed; and being wind-proof, it can safely be used in the most exposed places. It is very neat; and the gas consumption is given at 1¼ cubic feet per hour. Clark's sealable main-cock can be sealed either open or closed; and another speciality of the Crown Lamp Company is Colbran's anti-vibration ball joint. The space allotted to Mr. William Edgar contained inverted lamps, and a serviceable form of gas-flasher, besides the "Edgar" patent prepayment gas controlling apparatus. This is suitable for hotel bed and sitting rooms, &c., as, on the insertion of a coin or token, it gives a predetermined quantity of gas—either in a continuous supply or at intervals. Edgar's seal screw main-cock can be sealed in any position; and the plug cannot fall out. Messrs. Podmore and Co. made a good display of their well-known recuperative intensified lamps; and attractive specimens of gas-fittings were shown by Messrs. Falk, Stadelmann, and Co., Messrs. George Hands and Co., Messrs. Hodge and Co., Messrs. J. & W. B. Smith (who drew special attention to their "Silva" lamps), and Mr. L. F. Tooth (bracket with concealed pneumatic tubes). Messrs. Ingram and Kemp had a board mounted with various fittings made from the solid rod. Messrs. C. H. Kempton and Co. made a varied show with "N.I.C.O." burners, various gas-fittings and lighting devices, mantles in different stages of manufacture, inverted lamps, &c. Collections of burners were lent by Messrs. Bray and Co. and Mr. P. J. Smithers.

The Voelker Lighting Corporation had a very complete little exhibit in a case to illustrate the manufacture of mantles. There was everything there—ramie grass, cerium, and thorium, right up to the finished mantle. Mr. P. G. Somerville had a stand on which he showed the Gaslight and Coke Company's system of non-collodionized mantles. There were examples of the various stages from the ramie to the completed mantle; and members could see both the stockings and the burnt-off mantles.

Automatic lighting and extinguishing devices were strongly represented—by the Distance Lighting Company (with the "Bamag" apparatus), the Horstmann Gear Company, the Pneumatic Lighting Company, the Telephos Domestic and Street Lighting Company (with the Telephos system and A. E. Broadberry's apparatus for lighting and extinguishing street-lamps), and the Auto-Lighter. There was to be seen at the stand of the Pneumatic Lighting Company a metallic action dry governor in miniature. The Horstmann atmospheric bye-pass is a useful little article to which attention was drawn; and it was shown that the blue flame does not easily blow out. At the same time, it does not soot the mantle. A strong point in favour of this form of atmospheric bye-pass is that it can be readily cleaned by removing the atmospheric sleeve. Corrosion is guarded against, when desired, by the provision of a jewel gas orifice. This bye-pass is suited to any class of burner, for use inside or outside the mantle.

There was also a large gathering of gas heating apparatus. Clark's Syphon Stove Company had on a revolving stand some of the appliances with which their name is identified—including the new "Motex" heater. There were specimens of the Davis Gas-Stove Company's new barless fires, the steamless radiator, the luminous radiator, and the latest type of "screwless" cooker. Messrs. Fletcher, Russell, and Co., in addition to many laboratory appliances, &c., had in operation an automatic cut-off gas-heated steam-boiler for use with radiators. When there is 1 lb. pressure of steam on the radiator, the gas is automatically cut off—leaving only a pilot-light burning. The Imperial Stove Company displayed two new pattern gas-fires, with a section of a stove fitted with their patent burner and regulator. A gas-fire fitted with an advertising flashing device was exhibited by the Richmond Gas Stove and Meter Company, in addition to the "Avon" water-heater, the "Daisy" greenhouse heater, and a selection of their fires and other appliances. Messrs. Wilson and Mathiesons called attention to their circulator and other specialities, including the Reed radiator with its luminous flame, and a kettle in a casing which is stated to boil a gallon of water with 4 cubic feet of gas. It is a handy thing for restaurants and other places where boiling water is likely to be wanted quickly. Messrs. Ewart and Sons' geysers, Messrs. Davey and Roberts's coke-heated circulator, and Mr. T. Potterton's "Victor" automatic gas-heated hot-water supply apparatus completed this section of the exhibition.

There were meters in glass cases from Messrs. George Glover and Co.; and the discount meter of the Rotary Meter Company was also on view. Messrs. Tilley and Co. showed the Peebles prepayment gas-meter actuated from a distance. The idea of this is to enable the consumer to keep the meter cash-box in a safe place—not necessarily near the meter itself. When a penny is placed in the box, the action of a pneumatic tube opens the valve of the meter. Particulars of Messrs. Tilley's high-pressure gas lighting system may be put aside for a separate article in our next issue. Messrs. Harper, Phillips, and Co. showed a Brockway-Phillips gas ventilating-fan; Messrs. Alldays and Onions, their "Empire" high-pressure gas-burners and blow-pipes and their "Empire" blowers and exhausters.

Messrs. W. Canning and Co., at a fully equipped stand, gave practical demonstrations of lacquering, &c. This is a branch of work to which the firm devote much attention. Another process which could be inspected was electrolytic cleaning for taking all grease off metal. The Hotton Lighting Company had a big selection of malleable iron fittings, as well as some samples of the new alloy "Miralite," which can be cast, drawn, rolled, spun, turned, screwed, brazed, welded, &c. It takes a fine polish, and is said not to tarnish. It resists sea air and acid. An ingenious arrangement was exhibited by Mr. Tooth, in the shape of an ordinary alarm clock arranged for turning off (say) shop window lighting at a predetermined time. The unwinding of the alarm at the time for which it is set is made to shut off the gas-tap.

Models, photographs, &c., were shown by: Messrs. Babcock and Wilcox, the Bryan Donkin Company, Messrs. Clapham Bros., the Economical Gas Apparatus Construction Company, Mr. A. R. Griggs, Messrs. Head, Wrightson, and Co., Messrs. W. J. Jenkins and Co., Messrs. Parkinson and W. & B. Cowan, Mr. Tooth,

Messrs. C. & W. Walker, Messrs. George Waller and Co., Messrs. Willey and Co. Mr. Samuel B. Chandler, a member of the Association, whose washer-scrubber "bundles" have before been referred to in our pages, had on view a model of his invention. This "bundle" is composed of sheets of metal punctured by orifices of a "ragged" nature, forming liquor-holding devices, effectually cutting up the gas, lifting the liquor, and bringing the gas and liquor into intimate and close contact one with the other. The serrated edges of the metal form a very convenient means of lifting the liquor, and are of great utility in that they create a continual shower of drops through which the gas passes. The sole makers and licensees are Messrs. Head, Wrightson, and Co.

Other displays that may be noticed were those of Mr. T. Bugden (gas-bags), the British Mannesmann Tube Company, Messrs. J. J. Griffin and Sons (Boys calorimeter and Smith radiometer), the Lead Wool Company, Messrs. Pitkin and Co. (Pitkin-White pyrometer for measurement of high temperatures), and Messrs. Ready and Sons (small fittings and brass goods).

During the evening, there was a sitting, at which Mr. Stanley H. Jones, the Engineer and General Manager of the Commercial Gas Company, delivered an address.

The PRESIDENT (Mr. L. F. Tooth, of the Commercial Gas Company), on taking the chair, dealt briefly with the past, present, and future of the Association. He pointed out that from about 20 members nine or ten years ago, the number had gone up to 150; and for the progress made he said they were indebted to their Past-Presidents—Mr. W. Grafton, Mr. W. Upton, and Mr. W. J. Liberty. He wanted to make it quite clear that the exhibition that day had been arranged from an educational point of view. The whole of the work in connection with it had been done by Mr. Rothwell and Mr. Smithers. As they had seen, the apprentices which came under Mr. Smithers's charge had given a demonstration that afternoon, and had shown the advantages of being properly trained. He then called upon

Mr. STANLEY H. JONES, who delivered the following address on

THE DEVELOPMENT OF GAS MANUFACTURE, DISTRIBUTION, AND USAGE.

Gentlemen—Let me first say how warmly I congratulate you on the excellent demonstration in this hall of what can be done with gas, and on the many interesting things to be seen.

When your President asked me to address the Association, I felt considerable hesitation about the matter. For one thing, speech-making is not much in my line; and it seemed to me that perhaps I could not very well tell you juniors anything you did not already know. However, after a good deal of thought, I felt I could not refuse, and so decided to give you, to the best of my ability, a description of what my experience has been, in comparatively recent years, of gas manufacture, distribution, and usage. It is difficult to put fresh ideas before you. These are enlightened days; and there is a feeling that one may be only repeating ancient history attempting to tell you anything new.

I will speak on the general aspect of the gas industry. It must, I think, strike anyone who contemplates the growth of our industry how interesting the question of coal distillation really is. I think the general public do not quite realize what an extremely interesting process it is. We produce the gas; and after taking the gas, we produce the residuals which bring us profit, and which are of benefit to the community. There is nothing practically in the manufacture of gas as I know it which can be said to be anything but useful to the public. We have the coke, which is an essential to many of the great industries—for example, in cement manufacture; and then there are the liquids, in the shape of tar and ammonia, which are applied to various uses that are absolutely necessary to the present conditions of life. It must, I think, be an intense satisfaction to us one and all to feel that we are associated with an industry which is so extremely interesting from an economic point of view, and at the same time so beneficial to the general public.

Turning to the question of the production of gas from coal, we find that the quantity made per ton to-day, owing to modern developments, has reached a startling figure. We have quantities of 12,000 and 13,000 cubic feet per ton, due to modern invention. Some ten years ago, a make of 10,000 feet per ton was considered good working, and one was not accustomed to hear of anything more than this. To-day, however—owing, firstly, to the standard of illuminating power having been lowered and to the institution of a reasonable and fair method of testing—we have been able to produce, as I have said, our 12,000 cubic feet per ton, and perhaps a little more. The introduction of improved methods of carbonization of coal in retorts by means of generator and regenerator furnaces, has rendered possible the heating of the retorts to a much higher temperature than formerly with a greatly reduced consumption of fuel; and the revolution in the methods of charging and discharging those retorts by various forms of mechanism, by means of which they can be completely filled with coal, has also increased the quantity of gas made per ton of coal.

Then it will be noticed that this larger production has a very remarkable effect on the gas-coal market. The price of coal is of great importance, of course, to gas undertakings; and I have just been going into some figures relating to this matter. Referring to the Company with which I am connected, it appears that we have, during the last twelve months, attained a stage at which we find we shall reduce our coal consumption no less than 5 per cent., owing to the installation of modern appliances and machinery. Now this 5 per cent., calculated on the coal consumed in connection with the gas supply of London and the suburbs, I conclude would mean a saving of something like 150,000 tons of coal annually; and I feel that this will have a lasting effect in keeping the price of coal at a more moderate figure. Then we know it was thought the passing of the Miners' Eight-Hours Act would mean an increase in the price of coal, and it did increase the price at the time, owing to disturbance of the labour market. But in the result, it has been found that no less than 10 per cent. more coal has been put out by the collieries than before. This fact, taken in conjunction with the 5 per cent. reduction in the quantity used which I have referred to in connection with my own Company, is bound to have a very marked bearing on the question of coal prices in the future; and, of course, this means that gas can be produced cheaply.

Now I pass on to another phase of manufacture—to the question of purification, which until about five years ago was a very troublesome matter in the Metropolis. Then the abolition of sulphur testing was brought about; and a great boon this step has proved. The late Sir George Livesey strove for years to remove from the Metropolitan Gas Companies the worry of the unnecessary test for sulphur. The imposition of this test involved the extravagant use of lime for the extraction from each 100 cubic feet of gas of a few grains of carbon bisulphide. Sir George demonstrated the interesting fact (which is most probably known to you all) that in the air of a room where no gas is being burnt, there is, for all practical purposes, as much sulphur as in a room where gas has been burning for some hours. This was proved to the satisfaction of Lord Rayleigh. The purification of gas used to be a very considerable item in the cost of manufacture. But in London we have been relieved of the restrictions to which I have referred; and for this our thanks are due to Sir George Livesey. There is another point, too, on the manufacturing side of the question, in connection with which the abolition of lime purification has had a very beneficial effect on the working: The use of lime caused considerable back-pressure, owing to its density; and I estimate that the relinquishing of this material for purification purposes reduced the back-pressure in the purifying plant of gas-works about 50 per cent. This is a most important point, as it renders the risks of gas purification very much less than formerly.

There is another feature in connection with manufacture which I should like briefly to touch upon, and that is the question of the bearing the daylight consumption of gas is having on the works side of the gas industry. The extraordinary increase in this direction has done away with the necessity for gas undertakings to rely, as they used to do, upon what I may term rather extensive gasholder storage. The constant output during the day largely absorbs the production of gas; and the increase in the consumption that takes place when darkness arrives, is a comparatively small matter. Some fifteen or twenty years ago, the daylight consumption was extremely small; and gas undertakings then had to find storage for practically sixteen hours' make out of the twenty-four. The extent to which the daylight consumption has grown will be gathered when I mention that in fifteen years my Company have increased their day output over 100 per cent.; and we have been able to do this without any extension in the way of storage accommodation.

Nowadays we have found it necessary to increase pressures very substantially. In fact, they are practically double what they were fifteen years ago; and a satisfactory feature about this is that it has been effected without any increase in the unaccounted-for gas.

Returning to the question of manufacture, I am going to mention carburetted water gas. My Company have largely employed this for the past ten or twelve years, with very beneficial results. A carburetted water-gas installation possesses an extraordinary attraction from the fact that on a very small ground space and at a low capital cost, you can produce a large quantity of gas in a very few hours, which cannot be done with coal retorts. The prejudice against carburetted water gas, I think, may well be discounted nowadays, because for years it has been working most satisfactorily. Among other advantages, in my Company's district we find that carburetted water gas has had a most useful effect in connection with the naphthalene question. Years ago, we were greatly troubled with naphthalene; but now we have carburetted water gas, naphthalene has become practically speaking a thing of the past.

Then as regards the developments of the uses of gas, one of the most remarkable things in this direction which my Company have experienced is the growth of the use of gas for engines. A few years ago, we estimated that we were selling no less than 10 per cent. of our gas for engine purposes; and we are still doing good business in this direction. In many places, the internal combustion engine is ousting steam. We found it profitable to give the users of gas through engines substantial discounts off the price of gas. We give up to 20 per cent. discount; and we find that it pays. We have also applied the same system with great success to the consumers of gas through other appliances for trade purposes. The various uses of gas in our district include: Annealing, assaying, coffee roasting, japanning, plate bending, soldering, tempering, tinning work, &c. This is a branch of business which is rapidly growing; the application of gaseous fuel to the refining of metals being the latest development of

magnitude within my experience. The field of trade use is one where gas can, in my opinion, successfully hold its own; and it is a business that will mean a lot to us in the future.

The extraordinary growth of business in the shape of the consumption of gas through coin-meters, while necessarily calling for capital outlay, has resulted in the opening up of a branch of business that is one of the most secure a gas undertaking can have. The electrician has no chance, in my opinion, against the coin-meter; and I think that throughout the country the business in this direction is most satisfactory. The consumption of gas in my Company's district through prepayment meters has increased most marvellously. At present, the coin-meter consumers outnumber the ordinary consumers by more than three to one; and they are still increasing. It was told by a house agent the other day that he could not let houses now in which there was not a penny-in-the-slot meter fitted.

The use of gas for cooking and heating stoves is a factor which perhaps should not be put second to any other. I find the dinner-hour consumption of gas—from 12 to 1 o'clock—to-day is 300 per cent. greater than it was fifteen years ago. As regards heating-stoves, I believe that the Gaslight and Coke Company are doing wonderfully well in their district. My Company do not possess a residential district which largely takes heating stoves, so that I cannot speak so well from my own experience in this matter. But undoubtedly the prejudice which has been felt about gas cooking and heating stoves has been largely removed. It has been lately stated that a Medical Association have decided to use gas for the lighting of their premises, instead of electricity; and if you have the doctors to back you, you ought to be all right.

A most notable feature about our industry is the manner in which we have had to undertake business which originally was considered quite outside our duties. We have, in effect, become nothing more or less than big ironmongers. We have to provide apparatus and give skilled advice; and I think the makers of the different gas appliances are beginning to regard us as their best friends. The consumer, I think, feels safer in the hands of the gas undertaking than he does in those of anybody else. He knows who to put the blame on if anything goes wrong. This feature of our business I, for one, think is only as it should be.

We who are associated with the gas industry have now to work on more scientific lines than originally. We have to make our standard of knowledge of a higher grade, and be prepared to come forward and speak and advise when called upon to do so.

I do not know that I have much more to say. The few figures I have given to-night I hope will be of interest. To some of you they may be new; to many they are probably familiar. Your President, I am happy to see in the chair; and I congratulate the Association on electing him. Mr. Tooth is very well known to me. He is a gentleman whose career I am intimately acquainted with, and have followed with a good deal of interest. I believe he is one of those whose names will go down into gas history. He will no doubt have some good things to tell you—particularly in connection with smelting by gas—when he addresses you, as he is going to do, at a subsequent meeting. I believe that you are to visit my works during the session; and I can assure you of a warm welcome.

VOTES OF THANKS.

Mr. T. F. CANNING (Ilford) proposed a very hearty vote of thanks to Mr. Jones for his address, which he remarked was a fitting sequel to the one given by his father, Mr. H. E. Jones, on "Labour," two years ago. He thought that they, as a Junior Association, must consider themselves fortunate in having so many distinguished names among their patrons. It was a great thing to them that gentlemen like Mr. Jones should be so generous in coming forward and giving them their experience.

Mr. J. G. CLARK (London) seconded the vote.

Mr. A. F. BROWNE, on being called upon by the President, made a very interesting speech in supporting the vote of thanks. He said he felt sure that the members, like himself, had been greatly encouraged by the progress that Mr. Jones had told them was taking place in the East-end of London. They must congratulate him as the Chief Executive Officer of the Company to whose great prosperity he had testified that evening. He agreed that there never was a time when things looked brighter for gas. Gas engineers would be wanted with an even larger all-round knowledge in the future than they had possessed in the past. Whether the number of gas engineers who would be required in the future would be larger than at present, he would not say; but he was absolutely convinced that, as far as the distribution department was concerned, though there were large numbers of men now engaged, in the future many more would be needed. It was the distribution department with which the future of the gas industry was bound up. There never was a time when he felt more certain of the successful future of gas, or when he felt more disposed to congratulate on their choice those young men who were fortunate enough to be turning their attention in this direction.

Mr. H. AUSTIN (London) also supported the resolution, and said he was pleased to hear Mr. Jones speak of the penny-in-the-slot meter. The growth of this system was an indication of the thriftiness of the people. They desired no bills at the end of the quarter, but to pay for their gas before they had it. Mr. Jones had spoken hopefully of the coal market. Well, he was very pleased to hear of this bright outlook, because he was a co-partner. The employees of the Company with which he was connected took up stock to a greater amount than their bonus. The bonus came to about £38,000; and they were taking over £40,000 worth of stock. Stock coming on the market was thus taken by the workers; and this made the stock keep at a wonderfully steady level.

The vote having been carried with applause,

Mr. JONES acknowledged it, and said Mr. Canning had referred to the address his father delivered to the Association some two years ago. He (Mr. Jones) had omitted to say that his father had sent a message. He had sent his kindest remembrances to the members, and wished continued prosperity to this very go-a-head Association.

Mr. D. J. WINSLOW (Lea Bridge) moved, and the HON. SECRETARY (Mr. S. A. Carpenter) seconded, a vote of thanks to the visitors—coupling with the proposition the names of Mr. A. F. Browne, Mr. J. W. Buckley, and Mr. J. M. Campbell.

Mr. BUCKLEY, in response, said that in his experience he had never seen assembled in so small a space so much food for gas men—not only from the manufacturing, but also from the distribution point of view. He agreed with the great importance of the distribution department.

Mr. CAMPBELL, one of the founders of the Association, also replied. One had only to look at the programme, he said, to see that the success of Mr. Tooth's year of office was assured.

The PRESIDENT said that, though Mr. F. W. Goodenough was not present, he would like to thank him for all he had done for the Association. He was a gentleman upon whom they could always rely for support.

On the proposition of Mr. F. AINSWORTH (Ilford), seconded by the HON. TREASURER (Mr. J. Hewett), the organizers of the exhibition were heartily thanked for the time and trouble they had given to make the meeting a success.

Mr. H. ROTHWELL, in reply, said that the President also had done a great deal towards keeping everything up to the mark.

The proceedings concluded with a vote of thanks to the exhibitors, which was proposed by Mr. P. J. SMITHERS, and acknowledged by Mr. WRIGHT, of Messrs. W. Sugg and Co.

Illuminating Engineering Society of America.

The Fourth Annual Convention of this Society, of which Mr. E. P. Hyde, of Cleveland, is the President, was to be held last Tuesday and Wednesday at Johns Hopkins University, Baltimore. The following papers were read: "Value of Illuminating Engineering to the Manufacturer," by Mr. V. R. Lansingh; "Practical Value of Illuminating Engineering to the Central Station," by Mr. J. F. Gilchrist; "Value of Illuminating Engineering to the Commercial Man," by Mr. W. J. Serrill; "Illuminating Engineering Sheets for the Calculation and Recording of Data," by Mr. J. S. Codman; "Central Station Illuminating Engineering Department Work and Methods applied by the Denver Gas and Electric Company," by Mr. C. F. Oehlmann; "The Relations between Pressure and Light Output with Various Gas Lamps and Burners," by Mr. Norman Macbeth; "Temperature Rise Due to the Energy Radiated in the Lower Hemisphere from Different Light Sources," by Messrs. J. G. Felton and E. J. Brady; "Some Spectral Luminosity Curves Obtained by Flicker and Equality of Brightness Photometers," by Dr. Herbert E. Ives; "An Unrecognized Aspect of Street Illumination," by Mr. Preston S. Millar; and "Effect of Light on the Movement of Lower Organisms," by Professor S. O. Mast. Following the Convention, there will be a course of 36 lectures on the science and art of illuminating engineering, the subject and scope of which have been proposed by the Society and approved by the University.

Society of British Gas Industries.—We learn from the Secretary (Mr. Arthur L. Griffith) that the autumn meeting of the Society will be held at the Waldorf Hotel, Aldwych, on the 22nd inst., at five o'clock—Mr. H. J. Balfour Browne, K.C., the President, in the chair. A paper on "The Society of British Gas Industries: What it Has Done, and what it Can Do," will be read by Mr. Fred. J. West, the Chairman of the Council; and it will be followed by a discussion. In the evening, the members will dine together in the hotel.

"Gas-Works Directory and Statistics" for 1910-11.—We have received from the publishers, Messrs. Hazell, Watson, and Viney, the above-named directory, which has now reached its thirty-third year. The contents, which occupy 22 pages more than in the issue for 1909-10, have been revised to August last; and the Editor acknowledges the assistance given to him by the officials of the various undertakings, which has enabled him to present the latest figures available. As usual, the statistics are preceded by the lists of the Chairmen, Managers, Engineers, and Secretaries, as well as of the Technical Associations connected with the gas industry. The price of the book is 10s. 6d. net.

Manchester and District Junior Gas Association.—The second lecture of the series arranged to be held in the Manchester University, of which particulars have already been given in the "JOURNAL," will be delivered on Saturday afternoon by Mr. Dugald Clerk, F.R.S., M.Inst.C.E., Hon. Member of the Institution of Gas Engineers; his subject being "The Phenomena of Explosions in Gas and other Internal-Combustion Engines." The chair will be taken by Alderman R. Gibson, the Chairman of the Gas Committee of the Manchester Corporation. No one is more competent than Mr. Clerk to deal with the subject named; and therefore it is to be hoped a large audience will avail themselves of the opportunity of hearing him.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas-Heating Research Committee.

SIR,—The Gas-Heating Research Committee, thinking that there may be members of the industry who would be interested in a further discussion of the work which has been carried out in the Fuel Department of the University of Leeds during the past two years, propose to hold a conference on Wednesday, Nov. 9, at 2.30 p.m., in the University buildings.

Mr. E. W. Smith will give a summary of the work which has been carried out, and a short account of the questions involved.

The subject will be open to general discussion.

The Committee wish to convey through your columns an invitation to gentlemen representing gas undertakings and gas-stove manufacturers to be present on the occasion.

Arrangements will be facilitated if those who propose to attend will send an intimation to Professor Bone, at the University.

ARTHUR SMITHELLS,
Chairman of the Committee.

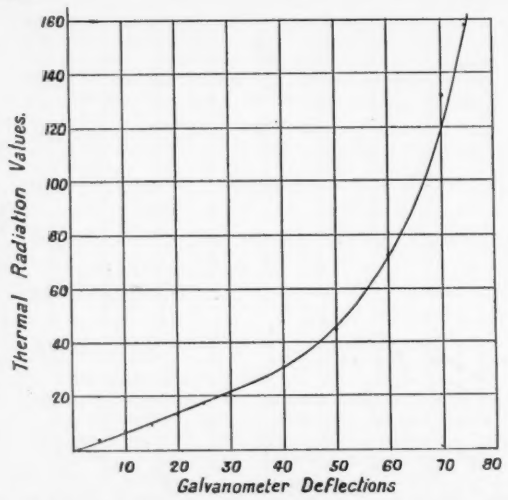
The University, Leeds, Oct. 28, 1910.

The Testing of Gas-Fires.

SIR,—I have read with interest "Experimeter's" letter in your last issue. Referring to the last paragraph but one, it appears that he is quite convinced that the absurd results given by the thermopile are due to the varying distances. As pointed out in my last letter [*ante*, p. 206], I cannot quite agree with this view. It appears to me that so long as the width of the fire does not exceed the diameter of the hemisphere, the varying distances are of no importance. My reason for thinking so is as follows.

A source of radiation is enclosed in an imaginary hemisphere which intercepts the whole of the radiation. The radiation is distributed over the surface, and if this surface is divided into a number of small sections, and the intensity of the radiation on each section measured, then the total radiation over the whole surface could be calculated. If expressed mathematically, it would appear as follows: If R be the intensity of the radiation upon a section dA of the hemisphere, then the total radiation on dA would be $R.dA$. If the whole surface be explored in this way, then $\int R.dA$ would be the total radiation on the hemisphere.

From the foregoing, it appears that the length of the path of the rays is of no importance, nor is it essential that the source of the radiation should be at the centre of the hemisphere; the only important condition being that the hemisphere should intercept the whole of the radiation. Of course, if the source of the radiation is eccentric with the hemisphere, the distribution would not be symmetrical; but the integral value $\int R.dA$ would be the same. The difficulty is to accurately measure the intensity of the radiation. I consider the thermopile fails to do this; and "Experimenter's" results bear me out. I think he is quite right in abandoning the conical hood, and in taking the centre of the pile as the centre of the instrument. But from his results it would appear that there are some other sources of error, perhaps at present unknown.



In regard to the inequalities of the radiation values of the galvanometer readings, I can confirm "Experimenter" in this; and I give herewith a diagram of a calibration curve, from which it appears that a fair proportionality exists up to a deflection of 40. But beyond this a correction must be made. This may be due, as "Experimenter" suggests, to increased torsion of the spring control; but it may be partly due to a change in the E.M.F. equivalent of the couples at increased temperatures.

I was interested to read "Experimenter's" method of eliminating the conduction error in the radiometer. It is, I consider, quite correct, and is similar to a method I have adopted myself.

I shall be interested to hear later on the results of "Experimenter's" endeavours to improve his apparatus. But I am of the opinion that a purely calorimetric method is desirable; and it is along these lines that my own apparatus has been devised.

J. G. CLARK.

Oct. 28, 1910.

Automatically Lighting and Extinguishing Public Lamps.

SIR,—Referring to the letter from Mr. Arthur H. Francks in your last issue, I would suggest that his disclaiming any "intention of booming any individual lighter" is somewhat disingenuous, having regard to his so strongly advocating the advantages of the "apparatus invented by Mr. A. E. Broadberry" [*vide* his letter in the "JOURNAL" for the 11th of October], and his use of synonymous terms to those appearing in the advertisement of this apparatus, in order to express his admiration—viz., "working parts easily accessible and outside the gas supply." This gives point to a remark made by another of your correspondents in regard to statements which "emanate from interested parties, and constitute advertisements for a particular manufacturer or apparatus," as, though Mr. Francks is not apparently interested in the apparatus he so strongly recommends, there will no doubt be some suspicious individuals who will assume the contrary, and think he "doth protest too much."

I much regret that Mr. Francks "cannot share 'Contributor's' enthusiasm for the apparatus mentioned" by me, when arranged to light at a high pressure and extinguish at a low one. But I am relieved to see that when it is arranged to "extinguish at a high pressure, which is at the same time lower than that required for lighting," it "is certainly an improvement."

With regard to the former arrangement, I would remark that, inasmuch as, when the gas-bell rises in the "Eureka" apparatus (for lighting) it is automatically relieved of weights, it follows that less pressure is required to keep the bell up than to actuate it in the first instance, and that it will only fall (for extinguishing) when a certain low pressure has been reached; for example: Lighting pressure 50-10ths, extinguishing pressure 20-10ths. In these circumstances, it would not be necessary for the gas company to "maintain a comparatively high pressure right through the early hours of the morning." With regard to the arrangement of the "Eureka," which meets with the approval of Mr. Francks, the following example may be given: Lighting pressure 50-10ths, extinguishing pressure 40-10ths. In either case, the range may be varied by adjusting fixed and movable weights.

With reference to the apparatus Mr. Francks recommends, which only operates when a "sharp increase" is given, "irrespective of what the initial pressure may be at the time," is it not within the bounds of possibility that such "sharp increases" may be given several times a day or at night (particularly in manufacturing centres) owing to the shutting-down of gas-engines, &c., by large consumers, with the result that the apparatus will operate when not desired?

I regret having had to take up the cudgels; but, the apparatus I mentioned having been directly named and compared with apparatus (difficult to identify) said to have been "tried, condemned, and banished from this country twenty-five years ago," I feel I am compelled to do so.

EUREKA.

Oct. 26, 1910.

A Flourishing Lincolnshire Gas Company.

The report presented at the recent annual meeting of the Louth Gas Company showed a profit on the year's working of £3480, and a balance of £3829 on the profit and loss account. It was decided to pay dividends of 14¾ per cent. on the original capital, 11¾ per cent. on the new (1877) ordinary stock, and 5 per cent. each on the "A" and "B" stocks. Out of the £1792 left, £1098 is carried forward. A reduction of 2d. per 1000 cubic feet in the price of gas was also determined upon; making it 3s. 8d., less 15 per cent. discount, or about 3s. 1d. net. A further 10 per cent. is allowed for gas used for power and public lighting. The average make of gas per ton of coal increased from 10,478 to 10,647 cubic feet; while the unaccounted-for gas was only about 4 per cent. of the make. The gross cost of gas into the holders in the past year was 1d. per 1000 cubic feet less than in the preceding twelve months; and the net cost, after deducting the income from residuals, was less by more than 3d. per 1000 feet. The gross profit had materially increased, and, according to the Chairman (Mr. B. Hall, J.P.) probably constituted a record in the history of the Company. By special resolution, the shareholders acknowledged the valuable services of the Engineer and Manager (Mr. J. A. Young); it being the general opinion that the continued success of the Company was largely due to his painstaking interest in it.

Position of the Coalite Companies.—The following letter, sent by a correspondent from the Stock Exchange, appeared in the "Financial News" last Friday: "In view of the many adverse comments that have recently been made in the Press concerning the prospects of the British Coalite Company and Coalite Syndicate, and the accompanying very severe fall in the prices of the shares of these concerns, it would be interesting for shareholders to hear what the Directors have to say on the subject of the Companies' finances and the things they were on the point of achieving at the time of the last general meeting. The reticence that has been shown with regard to the latest debenture issue is rather disquieting; and it is as well that it should be known at once whether this important matter was arranged satisfactorily or not."

Good Results at Tipton.—A Birmingham paper states that at the last monthly meeting of the Tipton Urban District Council, the Gas Committee reported that the Mond Gas Company had re-arranged the connection at the works dealing with the supply of town gas, with the result that there was no chance of a repetition of the accident by which Mond gas found its way into the mains. The analysis of gas accounts just published showed that the Council's gas-works occupied a very high position, excelling those of their neighbours in working results and cost of manufacture—in fact, it stood among the first dozen in the country for efficiency and good working. A communication had been received from the General Purposes Committee stating that it was the intention of the Council to ask for a reduction of 25 per cent. in the charge for street lighting. The Committee gave the matter long consideration, and ultimately deferred it for a month.

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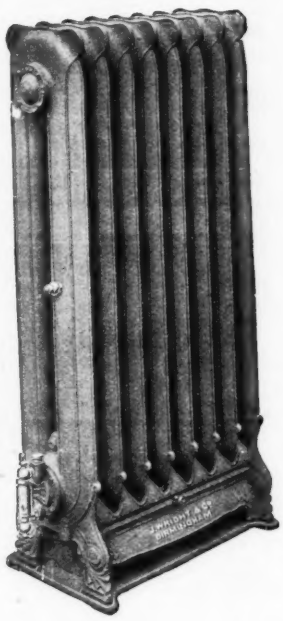

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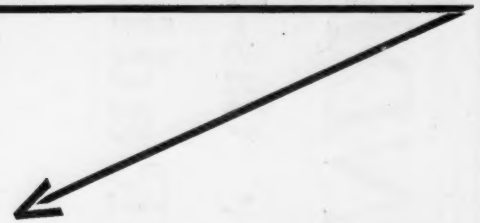
FIDDES ALDRIDGE

SIMULTANEOUS ONE STROKE STOKING MACHINE



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REGISTER OF PATENTS.

Distilling Coal in Vertical Retorts.

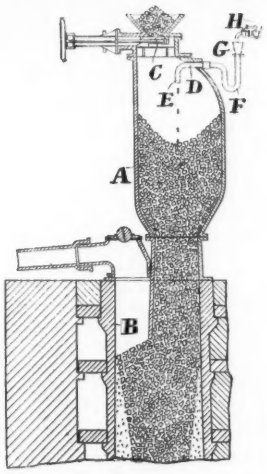
GLOVER, S., of St. Helens, and WEST, J., of Southport.

No. 20,309; Sept. 4, 1909.

This invention relates to the continuous distillation of coals in vertical retorts for the production of coal gas; and it has for its objects "to aid the descent of the charge through the retort, to improve the quality of the residual coke, and to prevent stoppages by tar and other thick deposits in the gas off-take pipes."

When the coal is distilled in vertical retorts, the patentees point out, the heat imparted to the coal through the walls of the retort first carbonizes the outer portion of the charge which is in immediate contact with the sides of the retort; and the heat has to penetrate the charge in order to carbonize the centre or core of the charge. It is obvious that the centre or core of the charge does not become completely carbonized until it has travelled some distance through the retort. According to this invention, the coal, immediately before it enters the retort, is treated in such a manner that the tarry mass in the core will be more fluid, and the heat, in consequence, will have a quicker and more even effect on the charge during its descent through the retort.

In carrying out the invention, a small percentage of water (varying in quantity to suit the physical condition of the coal) is added to the coal at a point immediately prior to its entry into the retort. The tar formed from this moistened coal is much thinner than with dry coal, and therefore spreads itself throughout the upper portion of the charge, whereby it is more readily split up into permanent gases of high illuminating power. The tar driven off with the gas from the retort is thinner, and its fluidity enables it to pass through the take-off pipes without the risk of blocking-up as with thick and heavy tars. "The thorough and complete dissemination of the thin tar among the coal improves the texture of the coke, and so improves its quality."



Glover and West's Treatment of Coal in Vertical Retorts.

The illustration is a section of the upper end of a vertical retort, the retort mouthpiece, and the hopper through which the coal passes on its way to the retort—the coal being supplied to this hopper from a main store or bunker.

The coal is fed downwards through a hopper A into the retort B; and the hopper is itself fed through a coal-valve C situated to one side of the centre line of the hopper. The drip-pipe D passes through the side of the hopper and ends in a downturned portion E, which is near the centre line of the hopper. The outer part of the pipe D is bent to form a seal F, which prevents the exit of gas. It has a funnel-shaped open end G. A number of such pipes in a bench of retorts are fed from a common feed-pipe H.

By this construction, the core of the charge can be wetted as desired, while the hopper can be fed continuously without interfering with this wetting.

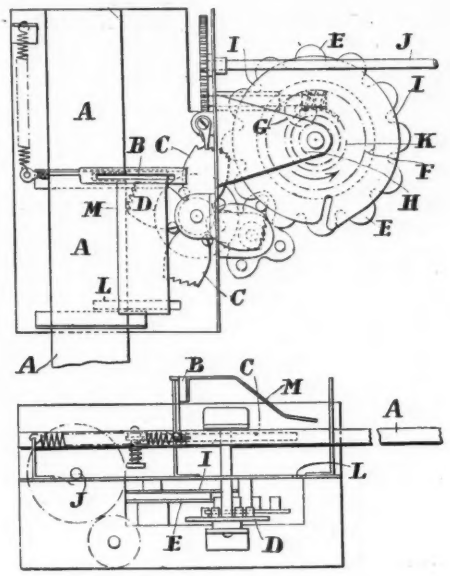
The inventors say they are aware that in the manufacture of water gas in continuous vertical retorts the water to be decomposed has been introduced into the top of the retort. Their invention is not concerned with this, but "in supplying water in small quantities to facilitate the descent of the charge in the retort in the manufacture of coal gas, and to effect other improvements in such manufacture."

Prepayment or Coin-Freed Gas-Meters.

FRANCKLIN, H. J., of Forest Gate, Essex.

No. 24,447; Oct. 25, 1909.

This invention has reference more particularly to the type of mechanism wherein a coin is introduced through a slot in a slide-bar and caused to actuate a disc or toothed wheel, with sun-and-planet motion, and a cam-plate which serves to actuate the opening and closing of the supply valve or switch. The patentee makes use of the known arrangement in which the planet wheel is mounted on a stud extending from a cam-plate, and rotates in both directions round a sun wheel and spindle, upon which is mounted the coin-operated disc or toothed wheel, and of another known arrangement in which the planet wheel meshes with an internally toothed ring fixed concentrically to, or integral with, the coin-rotated disc or toothed wheel. The coin is introduced into a slot in a hand-actuated slide-bar as described, and is caused to engage one of a series of radiating arms or levers extending from a boss by moving the slide-bar longitudinally, and to actuate through pin-and-wave wheels the sun-and-planet gear, for use in connection with the arrangement of parts to be described.



Francklin's Coin-Freed Gas-Meter.

A is a sliding-bar provided in a portion of its length with a slot which, when the slide is in its normal or inoperative position, coincides with a coin-shoot B, which serves for the introduction of (say) a penny into the mechanism for enabling it to be actuated when the slide-bar is moved. The coin falls into, or engages with, the slot, and when the sliding-bar is withdrawn or moved longitudinally, it causes the coin to rotate one of a series of radiating arms or levers a definite amount for operating gearing.

The radiating arms C, extending from a boss, are mounted on a pin on a pin-wheel D, which engages with a disc, provided with projections for engaging with the pin-wheel. The disc is also provided with pins which engage with a member E, having an edge provided with teeth for engaging with the pins and mounted on suitable brackets on the framing of the mechanism.

The member E is provided with internally toothed gearing F, which engages with a planet wheel G, geared with a sun wheel H. When the member E is rotated through the radiating arms C, being operated by the coin, the internally toothed gearing F rotates the planet wheel G, and this, owing to its gearing with the sun wheel (which is held against rotation), causes the cam-plate I to be rotated in the direction indicated by the arrow and operate the valve, so as to enable a supply of gas to be obtained.

In this way, the valve is operated from the open to the closed position, or *vice versâ*, and when either of these positions is obtained, the valve is no further affected by the cam-plate I, except that the means for engaging with the notched projecting portion also serves to stop the cam-plate travelling beyond the normal zero position.

When a coin has been introduced into the shoot B, and the mechanism actuated as described, a definite supply of gas is obtained—governed by the movement of the cam-plate I, by means of the radiating arms and interposed gearing. While the supply thus obtained is being used, the operating mechanism of the meter controlling the supply, which is connected up with the rod J, is rotated; and this rotation through gearing is transmitted to the worm wheel K, fixed to a spindle, through which the sun wheel is rotated, and causes the return of the planet wheel G and the cam-plate I to the zero position.

The coin is released from the slot in the sliding-bar A, after it has been moved by the slide over the slot L, provided in the upper surface of the coin receptacle (not shown). To ensure the coin passing into the slot, a spring M is provided for pressing it through when it arrives in this position.

Connecting Branch Service Pipes with Mains.

JOHN RUSCOE AND CO., LIMITED, and KENYON, G. H., of Hyde.

No. 29,199; Dec. 14, 1909.

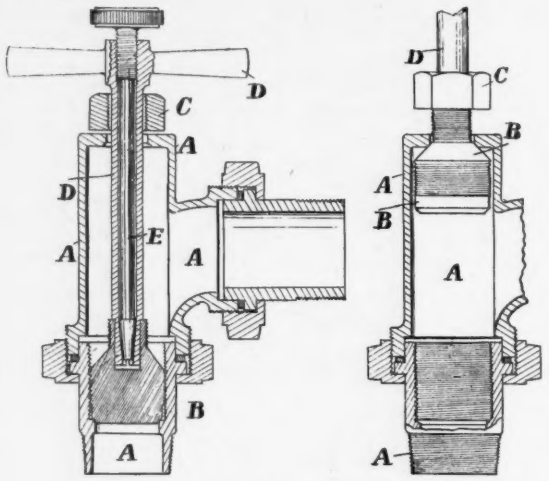
This invention, relating to means for connecting branch service pipes with (say) gas and water mains, forms an improvement upon patent No. 676 of 1905.

According to this prior invention, a screw valve, closing the main below the branch outlet, is capable of being unscrewed by means of a key, when it is carried by pressure of the fluid, combined with the operation of the key, to a seating above the branch outlet, where it is screwed into position after having thus, by its transfer, opened communication between the main and branch pipes.

In carrying out the present invention, the screw thread of the upper seating is dispensed with and a prolongation of the valve is provided, which projects through the top of the casing when the valve is in the upper position. The projecting extension of the valve is so formed as to be tightened up against its seating without interfering with the key connection. The prolongation and its accessory thus provide for the support of the valve in the upper position; and the valve may be

secured while temporarily held in place by means of the key, which, in some cases, may not need to be removed from the apparatus.

A is the pipe connection between the main and branch, formed with a screw thread to secure the valve B in the lower position. The special prolongation or extension of the valve, which projects through the casing, is screwed to take the nut C. The key D, suitably formed for engagement with the valve B, is split at its extremity, so as to be capable of being expanded by a plug E, which is passed into the interior of the key.



Ruscoe and Kenyon's Main and Service Connector.

In operation, the nut C is passed on to the barrel of the key, which latter is then inserted into the casing, and caused to engage the valve at the lower seating. By means of the screw on the plug E, the plug is advanced within the key to expand the extremity, whereby the valve and key are connected. The valve is then unscrewed and raised; being so held while the nut C is screwed down over the prolongation. The key may then be contracted and withdrawn, and a cap F be screwed into the top of the nut to protect the top of the valve.

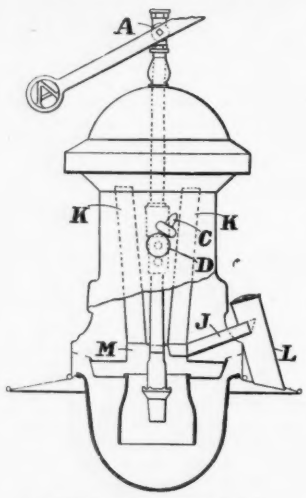
Lighting Gas-Lamps.

BURCH, A. R., of Bombay.

No. 851; Jan. 12, 1910.

This invention, relating to means for lighting gas-lamps or lanterns, has particular reference to apparatus in which an ignition tube passes from the inside to the outside of the lantern and is disposed so that, when the gas is turned on, an explosive mixture is formed in the tube whereby the gas may be ignited without opening the lantern.

The invention is especially applicable to lamps of the enclosed inverted incandescent mantle pattern. It consists of a small chamber on the outside of the lamp and a conduit making communication with the burner just above the mantle, so that when the gas is turned on and a mixture of air and gas issues from the burner, a portion of this mixture passes through the conduit into the chamber. On the application of a light in the chamber, the flame travels back to the burner, and ignites the main flame in the lantern. No bye-pass flame is necessary. The chamber has an opening in the top, protected by wire gauze, in order that sufficient air shall be present to make a slightly explosive mixture, and that the light inserted shall not be smothered.



Burch's Gas-Lamp Lighter.

As shown, gas enters by the cock A, which is operated by a lever. D is the gas-regulating nipple, and C the regulator of the air supply. The products of combustion escape by a chimney K into the upper part of the lantern. The chamber L (fixed outside the lantern) has its lower opening in the reflector, which is pierced for the purpose, or can be fixed outside the edge of the reflector. It communicates with the burner chamber M by means of the passage J, which is set at an angle of 30° with the horizontal—one end being a collector—in the form of an inverted trough, and the other being a bevelled end, projecting into chamber L. When the gas is turned on, and a light is applied up the chamber L, so that it reaches the bevelled mouth of the conduit J, the flame travels to the burner and the lamp is lighted without opening the lantern.

Purifying Coal Gas after the Extraction of Ammonia.

FABRY, R., of Sheffield.

No. 7766; March 31, 1910.

In order to recover ammonia direct from coal gas in the form of ammonium sulphate, it is necessary (the patentee points out) that the gas be brought in intimate contact with an acid lye of ammonium sulphate, of suitable temperature and acidity, after the gas has been deprived of most or all of its tarry components. This has hitherto been carried out in two different ways, which mainly differ by the temperature at which the gas comes in contact with the acid lye of ammonium sulphate and by the amount of water vapour in the gas which condenses during the treatment of the latter.

The first existing method aims at producing ammonium sulphate with very little or no condensation whatever of the water vapour contained in the hot crude coal gas. It consists in cooling the hot crude coal gas not more than is strictly necessary to effectively remove from it the tarry matters which it carries in suspension before passing the gas, at a temperature still above that of its water dew-point, through a saturator wherein it is brought into intimate contact with an acid lye of ammonium sulphate. Practically the whole of the fixed ammonia is then contained in the coal gas entering the saturator; and this fixed ammonia, being converted into ammonium sulphate by the free sulphuric acid present in the acid lye of ammonium sulphate, the weaker acids—such as sulphurous acid and hydrochloric acid—which were originally combined in the fixed ammonia, are liberated and escape from the saturator together with the coal gas, the nature of which becomes thereby acid and highly corrosive. In this method the temperature of the acid lye in the saturator is generally maintained by applying heat to it by steam-coils, steam-jackets, and the like.

The second existing method consists in cooling the coal gas more or less below the temperature of its water dew-point, in order that a suitable portion of the water vapour contained in the gas may condense and retain all the fixed ammonia. The gas is thereupon freed from its tarry components by means of a tar-separator of suitable description, and subsequently passed through a saturator containing an acid lye of ammonium sulphate which is maintained at the most suitable temperature either by heating the lye by means of steam-coils, steam-jackets, and the like, or by superheating the coal gas above the temperature of its water dew-point previous to its passing through the saturator.

The last method aims at retaining practically the whole of the fixed ammonia before the saturation of the coal gas takes place; but owing to the highly volatile nature of the ammonium chloride which constitutes the bulk of the fixed ammonia present in the crude coal gas, the result obtained is still imperfect, and the gas escaping from the saturator still contains an appreciable amount of hydrochloric acid—especially so when the gas is not cooled down to the atmospheric temperature before being forced through the saturator.

The object of the present invention is to purify the coal gas after the extraction of its ammonia in such a way that "the treated gas is perfectly free from injurious acids—such as sulphurous acid and hydrochloric acid—even when such gas is forced through the saturator at a temperature approaching that of its water dew-point."

For this purpose, the hot crude coal gas (coming from coke-ovens or gas-retorts) is treated as follows: The hot crude coal gas is first cooled down to or below the temperature of its water dew-point by means of suitable air-cooled or water-cooled condensers. Owing to this cooling, a certain amount of the water vapour originally contained in the coal gas condenses, together with a portion of the fixed ammonia. In order to reduce the condensate to a strict minimum, without impairing the efficiency of the process which constitutes the present invention, the cooling is so regulated that about two-thirds of the total ammonium chloride present in the crude coal gas is condensed by such cooling. The tar is then separated from the gas, after which the coal gas (free from tar but containing practically all its free ammonia and about one-third of its original fixed ammonia) is forced in the usual way through a saturator containing an acid lye of ammonium sulphate, and preferably covered with some non-conducting material in order to prevent as much as possible the loss of heat by radiation or convection.

In this saturator, the free sulphuric acid present in the acid lye of ammonium sulphate combines with the free and with the fixed ammonia present in the coal gas, and forms fresh quantities of ammonium sulphate in crystals, which finally settle at the bottom of the saturator and are extracted by means of a steam-ejector or of a compressed-air ejector.

The acid lye of ammonium sulphate in the saturator is, as usual, maintained at the most suitable acidity by a continuous or intermittent flow of sulphuric acid containing as a rule about 20 per cent. of water for the purpose of avoiding the extra cost of more concentrated acid.

The gas issuing from the saturator—and which is now deprived of free and fixed ammonia but containing injurious acids (such as sulphurous acid and hydrochloric acid) arising from the decomposition of fixed ammonia through the free sulphuric acid present in the acid lye of ammonium sulphate in the saturator—is then forced through a washer, in which it is brought in intimate contact with the spent ammoniacal liquor issuing from a distilling column hereafter referred to, for the purpose of neutralizing the sulphurous and hydrochloric acid by means of the surplus free lime contained in such spent ammoniacal liquor.

In this distilling column, the condensate or ammoniacal liquor arising from the partial cooling of the hot crude gas and containing a portion of the fixed ammonia originally contained in the gas is treated with steam and milk of lime so as to convert the fixed ammonia into free ammonia, which escapes from the distilling column in the form of ammoniacal vapours, together with the bulk of the steam used for

distilling the condensate. The ammoniacal vapours are mixed with the hot crude gas so as to reach ultimately the saturator and be transformed therein into crystals of ammonium sulphate.

It is a well-known fact, the patentee points out, that ammoniacal liquor cannot be treated efficiently with milk of lime unless the quantity of lime used for such treatment is about double that which is theoretically required to decompose the fixed ammonia. He takes advantage of this necessary surplus of free lime which has to be present in the spent ammoniacal liquor to neutralize thereby the sulphurous acid and the hydrochloric acid present in the coal gas issuing from the saturator without incurring any additional expense for obtaining such neutralization, or increasing the minimum quantity of noxious effluent produced by the process.

If preferred, the process may also be modified in that, the gas being less cooled-down, the condensate arising from the cooling is reduced or even entirely done away with, in which case the washer receiving the coal gas issuing from the saturator will be fed with fresh milk of lime in sufficient quantity to completely neutralize the sulphurous acid, the hydrochloric acid, and the other injurious acids present in the coal gas issuing from the saturator. "Altogether no appreciable advantage is, however, obtainable by such modification, as it is exceedingly difficult to avoid any condensation whatever of the water vapour contained in the hot crude coal gas without impairing thereby the efficient separation of the tarry components of the crude coal gas."

APPLICATIONS FOR LETTERS PATENT.

23,965.—Gunning, J., "Gas-flasher." Oct. 17.
23,975.—Riddell, W., "Conveying coal." Oct. 17.
24,018.—Westphal, C., "Retort-furnaces." Oct. 17.
24,035.—Wilton, G., "Treatment of gas." Oct 17.
24,061.—Kunick, G. H., and Painter, W. W. E., "Incandescent burners." Oct. 18.
24,086.—Mackenzie, J., "Quenching, screening, and loading coke." Oct. 18.
24,091.—Forth, C., "Pipe-couplings." Oct. 18.
24,118.—Miller, L. S., "Pumps and exhausters." Oct. 18.
24,131.—Reimers, G., "Condensers." Oct. 18.
24,138.—Drehschmidt, H., "Production of ammonium sulphate with impure acids." Oct. 18.
24,152.—Podmore, A. E., "Inverted burners." Oct. 18.
24,159.—Siemens Bros. and Co., Ltd., "Meters for water and other liquids." A communication from Siemens and Halske Akt.-Ges. Oct. 18.
24,160.—Schroeder, F. W., "Jointed pipes." Oct. 18.
24,170.—Marshall, B., "Gas steam radiator." Oct 18.
24,192.—Jack, W., "Liquid meter." Oct. 19.
24,268.—Benson, R. S., and Head, Wrightson, and Co., Ltd., "Coke and coal washing machines." Oct. 19.
24,269.—Benson, R. S., and Head, Wrightson and Co., Ltd., "Washing coal and other granular material." Oct. 19.
24,283.—Ernst, E. U. G., "Gas-producers." Oct. 19.
24,339.—Hersey, M. H., "Incandescent burners." Oct. 20.
24,348.—Upton, T. A., "Preventing the blockage of gas supply in holes in gas-burners." Oct. 20.
24,385.—Palmer, W. V., "Prepayment meters." Oct. 20.
24,393.—British High Power Gas-Engine Company, Ltd., and Neustadter, D. D., "Controlling the flow of a plurality of fluids to a common point." Oct. 20.
24,406.—Masters, R., "Charging and discharging gas-retorts." Oct. 21.
24,424.—Keith, J. & G., "Controlling the ignition and extinction of gas-lamps." Oct. 21.
24,466.—Sugg, W., and Co., Ltd., and Mattock, W. G. H., "Automatic gas-lighters." Oct. 21.
24,491.—Veeckmans, P., "Regenerative furnaces." Oct. 21.
24,493.—Anderson, D., "Gas-lamps." Oct. 21.
24,503.—Currey, L. E., "Carburetting air." Oct 21.
24,509.—Pearce, R. F., "Collection of matter suspended in gas." Oct. 21.

Application for Restoration of Lapsed Patent.

A. J. Lyon and G. F. Whitmore have made application for the restoration of the patent granted to them for "Improvements in apparatus used for lighting," No. 4383, bearing date March 2, 1905.

Bursting of a Water-Main in the Edgware Road.—As the result of the bursting of a water-main last Friday afternoon, the Maida Vale portion of the Edgware Road was flooded for a distance of more than a quarter-of-a-mile. For nearly an hour the water continued to flow, covering in many places the whole width of the road. Considerable damage was done by the water in the basements of several shops, as well as to the road, which in several places was torn up, and much inconvenience was caused.

Stockport Corporation and their Coal Supply.—When the minutes of the Gas Committee of the Stockport Corporation were brought before the Town Council for confirmation at their meeting last Wednesday, Alderman White said he noticed that the Committee had been buying more "spot" lots of coal. It seemed to him that if this went on they would be having cheap gas. He should, however, like to call attention of the Council to the fact that the Town Clerk had told them that by the Improvement Act of 1837 they could not go on "spotting." It was contrary to law. The Town Clerk said he did not remember having made this statement. Alderman White said he understood that they could not buy above a given quantity of coal without contract. Mr. Fearnley, the Chairman of the Gas Committee, in reply, pointed out that this matter was dealt with at the last meeting, and the Council did not object to the Gas Committee doing the best they could in the interests of the ratepayers; and this was what it amounted to. The matter then dropped. The minutes of the Committee included the following purchase: "Twenty waggons of Pilsey silkstone gas nuts, at 9s. 3d. per ton."

LEGAL INTELLIGENCE.

ACTION IN REGARD TO THE SELAS SYSTEM.

In the King's Bench Division a few days ago, Mr. Justice Lawrance and a Special Jury had before them the case of *Selas Gesellschaft v. Wolf and Another*, in which the plaintiff (a German) Company sought to recover a balance due upon an account under an agreement by which the defendants were employed to manage for the plaintiffs the sale of certain patent gas-making apparatus in England. Defendants admitted the plaintiffs' claim at £3553, but they set up a counterclaim to recover substantial damages for breach of an alleged agreement to employ them as Managing-Directors of a new Company, and to give them a certain share of profits. Plaintiffs disputed that any such agreement was made, and said there were only negotiations which were never completed. This left the onus upon the defendants of proving the contract they set up.

Mr. J. R. Atkin, K.C., and Mr. R. B. Murphy appeared for the plaintiffs; Mr. Gore Browne, K.C., and Mr. Raymond Asquith represented the defendants, Mr. Otto Wolf and Mr. Norman Banbury, gas engineers, carrying on business as Messrs. Bever and Wolf in Bradford.

Mr. Gore Browne, in opening defendants' case, said the plaintiffs were a German firm formed for the purpose of working a clever and valuable invention for the distribution of compressed gas and air together, which produced a better light and effected economy at the burner. The price of the apparatus in England was about £150. Defendants acted as agents for the plaintiffs from 1903. Plaintiffs were desirous of selling the English patent; and when the new Patents Act was passed, compelling foreigners to work English patents in England, it became an urgent question. Defendants said that the plaintiffs offered, on a sale of the patent being effected to a company in England for £50,000, to give them £8000, or 8000 £1 shares in the company, as well as a salary of £750 a year for managing the business, and 10 per cent. commission on the profits. They accepted the offer without reservation; and it was this contract they sought to enforce. They complained that when a company was being formed in England plaintiffs sought to impose on defendants unreasonable obligations which they could not possibly accept and which were not included in the original agreement.

Evidence having been given by Mr. Wolf and Mr. Banbury, it was arranged that the Jury should be discharged, and the case tried by his Lordship alone.

On the resumption of the hearing, Mr. Atkin submitted that the defendants had not made out any case as to the alleged agreement. Further, he urged that if there was any agreement it had been determined, and that there had been nothing further than negotiations for its renewal.

Mr. Gore Browne maintained that there had been an express offer made by the German Company, and the defendants had accepted it. They had adhered to the agreement, and it was the plaintiffs' Solicitor who in drawing up the formal agreement had departed from it. Further, he maintained that in any case Messrs. Bever and Wolf were entitled to 8000 shares in the new English company, whenever it might be formed, in recognition of their work in introducing the apparatus into England and pushing the sales.

His Lordship reserved judgment. This he delivered yesterday; holding that the defendants had failed on the counterclaim to make out any completed agreement. He accordingly entered judgment for the plaintiffs on the claim for £3330, with interest and costs, and for the plaintiffs on the counterclaim with costs. He, however, stayed execution on the usual terms, in view of appeal.

A GAS-FITTER'S CLAIM FOR LEAD POISONING.

WANDSWORTH COUNTY COURT.—Monday, Oct. 24.

(*Before his Honour Judge* Harington.)

Lewis v. Wandsworth and Putney Gas Company.

This was a case in which Charles Lewis claimed £1 a week compensation for total incapacity owing to his being disabled by lead poisoning while in the employ of the Wandsworth and Putney Gas Company.

Mr. W. Addington Willis (instructed by Messrs. Benham and Meyer) appeared for the applicant; Mr. Harold Morris (instructed by Messrs. Sloper, Potter, and Gosden) represented respondents.

Mr. Willis, in opening the case, said that the applicant was a man 56 years of age, who entered the employ of the Wandsworth and Putney Gas Company as a fitter in the year 1875; and he had continued to work for them in this capacity since that time, down to December last. This employment of his involved the continuous use of lead in varying forms—red lead, white lead, and molten lead; and after 34 years' service with the Company, he found himself disabled by lead poisoning, and had to come to establish his right to compensation in the Court, where he regretted to say he was met with every possible objection that could be raised under the Act.

Mr. Morris, after some discussion as to amendment of the answer put in by the respondents, said: My friend need not bother himself about "serious and wilful misconduct," or with the question as to whether the applicant is totally incapacitated from work. My point is that the disease is not "due to the nature of the employment."

Mr. Willis (continuing) remarked that the certifying surgeon had given a certificate that the man was incapacitated by lead poisoning; and the respondents had not appealed from this. In fact, it would not be denied that he was so suffering. Perhaps the section of the Workmen's Compensation Act, 1906, was rather complicated; and he might refer to certain points. Section 8 provided that where the certifying surgeon appointed under the Factory and Workshop Act, 1901, for the district in which a workman was employed, certified that the workman

was suffering from a disease mentioned in the third schedule to the Act, and was thereby disabled from earning full wages at the work at which he was employed, and the disease was due to the nature of any employment in which the workman was employed at any time within the twelve months previous to the date of the disablement, whether under one or more employers, he should be entitled to compensation under the Act, as if the disease were a personal injury by accident arising out of, and in the course of, that employment. It was also provided that the disablement should be treated as the happening of the accident. Sub-section 2 read: "If the workman at, or immediately before, the date of the disablement or suspension was employed in any process mentioned in the second column of the third schedule to this Act, and the disease contracted is the disease in the first column of that schedule set opposite the description of the process, the disease, except where the certifying surgeon certifies that in his opinion the disease was not due to the nature of the employment, shall be deemed to have been due to the nature of that employment, unless the employer proves the contrary." In sub-section 4 it was stated that the date of disablement should be such date as the certifying surgeon certified as the date on which the disablement commenced; or, if he was unable to certify such a date, the date on which the certificate was given. Under sub-section 6, power was given to the Secretary of State to make orders for extending the provisions of the section to other diseases and other processes. In the third schedule, the second disease mentioned was "Lead poisoning or its *sequelæ*;" and the description of the process given in the second column was: "Any process involving the use of lead or its preparations or compounds." The Secretary of State had slightly extended, as he had power to do, this schedule, by an order which he issued on May 22, 1907, so as to include the "handling" of lead. Therefore, he submitted that what he had to prove was that the man was engaged in employment which involved the "use or handling of lead or its preparations or compounds." When he had done this, and proved that the certifying surgeon had certified the applicant to be disabled by lead poisoning, he would have done all he was called upon to do. It would then be for his learned friend to show that the disease did not arise out of the nature of the employment. This was really the only issue. The facts were that the man's employment right through all the years he had named was in connection with making joints of different sizes; and to do this work, and other things, he had to use red and white lead every day, as well as molten lead. Working with white or red lead was dangerous; but, above all, there was great danger in the fumes from molten lead. In districts where there were lead works, one knew how devastating were the effects on animal and vegetable life. Lead poisoning was a very insidious disease. It might come upon a man immediately, or by a gradual accumulation in the system; but there arrived a climax, and the climax in this case came in September of last year. In the year 1908, the applicant had a nervous breakdown; but it was not necessary to say that this was due to lead. In the following year, however, he did a considerable amount of lead work; and, principally in September, he was engaged for three weeks fixing a 24-inch main, which involved the use of a considerable quantity of lead. He was doing this work indoors, in the meter-house, where, in making the joints, he had to use molten lead. The place where he was working was up near the roof of the building, where there was no ventilation to permit the fumes to escape; and the molten lead had to be put by him into the sockets just under his nose. The effect of this work was that he developed lead poisoning; and he was taken home and laid up for two months. In November he went to the works, and was told to get a certificate from the doctor who was attending him—Dr. Howell (the local Medical Aid Club's Doctor, and also a Director of the Company). He obtained from him a certificate that he was suffering from lead poisoning; and this was given to the Company, who, however, did nothing. Later on, the applicant was able to resume his work; and he went on until December, still using lead. On Christmas Day, he was again taken ill; and he had not done any work since. He ought, if he had understood the legal aspect, to have gone at once to the certifying surgeon, who would have given him a certificate; but it was not until June 23 that he did so. Therefore he was limited in his claim to this date, which meant that his client would have to lose compensation for the first six months of this year. Lewis was attended in December by Dr. Miller, in consequence of Dr. Howell refusing to do so, as he was a Director of the Company. On May 30, the applicant wrote to Mr. H. O. Carr, the Engineer, asking what the Company proposed to do; and the reply was that the letter had been put before the Directors. Subsequently, on June 15, he had a communication from the Secretary (Mr. C. W. Braine) in which the writer said: "There does not appear to be any work carried out by the Company's workmen in which the use of lead should cause the disease from which you are suffering." Not "could" or "would," but "should."

His HONOUR: The only question is whether the applicant is totally incapacitated.

Mr. WILLIS: It is admitted.

His HONOUR: Then why do you want medical evidence?

Mr. WILLIS: To show the effects of chewing, which the respondents say he did. Many people will state that chewing is a deterrent—if he did do it. Then I must show that molten lead particularly would be likely to produce lead poisoning.

Charles Lewis, the applicant, was then called, and bore out the opening statement. He explained how the different joints were made, and said that in September, when he was taken ill, he was working on the 24-inch inlet and outlet mains of a 100,000 cubic feet per hour meter. He was using molten lead for the sockets, and was standing on a scaffold up in the roof. The lead was pulled up to him in a pot, and he took it out with a ladle, and poured it into the joint. There was very little ventilation; and there were fumes from the lead when pouring it in. He was in a position in which he could not very well get away from the fumes. He did not feel any effect from them at the time; but one day before leaving the works he was seized with pains in the stomach which gradually got worse. His wages were £2 os. 6d. per week.

Cross-examined, witness said he had not recently done much lead mixing. The fitter's assistant would do it if not otherwise occupied. For the past five years he had been employed mostly on the works. The Company employed about 500 men, of whom about 200 went outside and the others were inside the works. Of those who were inside, sometimes one, and at others a dozen or more (but never much over twenty), would be employed on lead work. When he was engaged in the meter-house, the meter was being put up; but the walls of the house were filled in.

Mr. MORRIS: I suggest there was the iron structure; but the walls were not filled in. At the time you were doing the work, there was a good draught of air going into the house?

Witness: Yes. Continuing, he said he used red lead mixed with white lead, as a putty. Red lead came to the works in the form of a powder; but it was very heavy. White lead arrived in a thick creamy condition. The mixing of the two into a putty was left practically to the assistant. Then lead paint was used; and this was made with red and white lead and oil. This it was also the duty of the assistant to make. There were lavatories and wash-basins on the works; but he had no orders to use them. He was aware that it was necessary to keep his hands clean when using lead, and he did this by means of oil and waste—washing them subsequently. If he had some of the putty or paint on his hands, he admitted that it would be dangerous to put his hands to his mouth.

Mr. MORRIS: If a man chews, and in the process of chewing puts his hand to his mouth, I contend the poisoning arises, not out of his work, but from that habit.

His HONOUR: It seems somewhat far-fetched for the present.

Witness: I would not do it. Continuing, he said he had not chewed since 1908; and when he did do so, it was only once or twice a day. Loose shag was what he used, but he had not taken a pinch when he had lead putty or paint on his hands. He belonged to a sick fund connected with the works, and received 5s. a week from the fund.

Mr. MORRIS: And the Company add, as a voluntary payment, another 7s., making 12s. in all.

Mr. WILLIS: The contributions jointly made by employers to a sick fund should not be set off against any compensation awarded.

Mr. MORRIS: The 7s. a week which the Company pay has nothing to do with the fund.

Mr. WILLIS: If a man had scarlet fever or any other disease not arising out of his work, would he come on the fund?

Witness: Yes; if he subscribed.

Mr. WILLIS remarked that the Act said, if the certifying surgeon had given a certificate, and the disease was due to the nature of the employment, a man was entitled to compensation as if the disease were a personal injury by accident arising out of, and in the course of, the employment. The Statute said, not that it was an accident arising out of the employment, but that it must be deemed to be such. He scarcely appreciated the point brought forward.

His HONOUR: Neither do I.

Mr. MORRIS: I am saying this disease is not due to the nature of the work on which the workman was employed, but is due to his own habit of chewing tobacco. If you find the disease is due to a habit which the man exercises during the time of his employment, and but for that habit he would not have got the disease, then it is not "due to the nature of the employment."

Re-examined by Mr. WILLIS, witness said he never rolled tobacco and put it in his mouth when on a job. He had always been told that chewing prevented the fumes taking effect. The baths and wash-houses on the works, he thought, were put up for the stokers. He did not swallow the tobacco or the juice.

Dr. *R. F. Fraser*, the Certifying Surgeon for the district of Battersea, said he examined the applicant, and found him suffering from the results of lead poisoning. He reported the matter to the Home Office. The use of lead in the way here concerned would certainly be likely to cause poisoning, even supposing the man did not chew tobacco. The fumes from molten lead were very dangerous. Good ventilation would give a man a much better chance. One could get lead poisoning from absorption through the skin, by inhaling, or by swallowing. Sometimes it was very slow in action. For years the lead might be accumulating in the system.

His HONOUR: Is it necessary to call further evidence? Even if he did chew, the man says he never swallowed the tobacco or the juice; and if that was so, it would not get into the stomach. He says he did inhale, and he did get this stuff on his hands.

Mr. MORRIS said his clients had 500 workmen, and had carried on the business of supplying gas for very many years. Not only were those connected with the Company prepared to give evidence, but others would also say that there must have been something more than his ordinary employment to give this man the disease. A man might get poisoned from blue lead fumes, but not if there was proper ventilation. He would call someone to say there was perfect ventilation in the meter-house, because the house had not been built in, and part of the sides was open. Though the lead colic was ascribed by the applicant to the fumes during the work done in September, he (Mr. Morris) was going to ask whether it did arise from that cause. It could be got from lead putty or lead paint. Dr. Fraser apparently said poisoning could come through the pores of the skin; but his evidence would be that it could not be got in this way. It must be either by inhaling or swallowing. The white lead arrived in the form of cream; and the red was a heavy powder, which, if dropped, would not diffuse in the air. Further, his employment did not bring him into contact with the powder. It was some considerable time since he did any of the work of a fitter's mate. So inhaling might be ruled out. When the Board of the Company were confronted with the fact that they had medical advice that the man could not get this lead poisoning except by taking it into his mouth, they looked round to see if there was any explanation. There was every opportunity for the men to keep their hands clean, and Lewis was a very clean workman. If, in fact, a man was chewing while in a dangerous employment of that kind, and was taking in the course of his work pieces of tobacco out of his pocket, and pinching this tobacco when he had lead on his fingers, and was then putting the tobacco in his mouth with his hand, this would account for his getting lead poisoning where others had not. He submitted therefore that the poisoning was not due to the nature of the employment, but to the action of the man himself in doing something for his own personal use. Of course, it was in a sense due to the nature of the employment; but

what he was going to contend was that the fact of the lead being there was the *causa sine quâ non*, but not the *causa causans* of the disease from which he suffered. Was this disease due to the nature of the work in which the man was employed at any time within twelve months of the date of disablement? If it was found that during the preceding twelve months the man did not chew, or at any rate did not chew on the works, it must be due to the nature of the employment. If it was found he had been chewing on the works, then putting down the disease to the work he did with molten lead in September was incorrect, and really the cause of the disease was the tobacco.

Dr. *F. J. Wethered*, on the staff of the Middlesex and Brompton Hospitals, said he had studied lead poisoning. Ordinary pig lead poured on a cold material gave off fumes. It was, however, a question of ventilation. Assuming the ventilation was good, the chances of lead colic were very much lessened. Lead paint or putty on the hands would not affect a man through the skin as the applicant was affected. If he had paint or putty on his hands when he was chewing, he would, of course, be very likely to get it into his mouth.

Cross-examined: Chewing was very bad for the teeth.

Mr. WILLIS: Did you ever see a man with a finer set of teeth for his age than Lewis?

Witness said that, on the whole, his teeth were very good. They were not what he would expect in the case of an habitual chewer. A man might fail to get all the lead off his finger-nails, and in this way get it into his mouth with his food.

Mr. MORRIS said he would call more evidence on the point of chewing, as it might shorten the case.

John Hancock, foreman, stated that he had been with the Wandsworth Company for about ten years, and before that was for 25 years with the Commercial Gas Company. During all this time, he had never known of a case of lead poisoning among the men. When Lewis was working in the meter-house, the building was unfinished, and there were three or four openings, so that, of course, there was a draught. The highest lead joint was 2 or 3 feet from the edge of the roof, which was held up temporarily by a long iron girder. He had seen the applicant chewing in the workshop, but could not say whether he had chewed during the last two years, as Lewis had not been much at the works.

Charles Heath, for twenty years in the service of the Company, said he had known Lewis to chew. It was six or seven years since he was working with him; but he had seen him chewing after that.

His HONOUR: I feel no difficulty whatever in dealing with this matter. It is an admitted fact that the applicant is suffering from lead poisoning, and that he had been in the employment of the Gas Company for something like thirty years. The poisoning has been contracted during his work at the gas-works; but the contention of the respondents is that the poisoning is not due to the nature of the work on which he was employed. I am quite satisfied, after hearing the evidence, that it was due to the nature of the work on which he was employed. I accept the applicant's statement that he has done no chewing since 1908. I also accept his statement that he did not put tobacco into his mouth while engaged on a job. Therefore in my opinion (though I do not think it is quite material) the poisoning was contracted either by inhaling or by absorption—I think most probably by inhaling. Even supposing it had been contracted because he happened not to have his hands quite clean—although it is not necessary to decide this point—in my opinion that would not have deprived him from obtaining compensation.

The applicant was awarded £1 a week compensation, as from June 23 last, with costs on scale C.

ASSESSMENT OF THE FALMOUTH WATER-WORKS.

At the last Cornwall Quarter Sessions, the Falmouth Water-Works Company appealed against the assessment of their undertaking by the Falmouth Assessment Committee.

Mr. J. R. Randolph, who appeared for the Company, explained that the old assessment was £1730 gross and £1389 rateable value. This was raised to £2524 gross and £1966 rateable value; and the Company, while accepting the gross value, contended that the rateable value should be reduced to £1443. Mr. G. Humphreys-Davies gave evidence in support of the Company's figures. Mr. J. M. Hamilton, Secretary to the Company, said the total capital expended was £54,601. There had been an increase of £1234 per annum in the takings. Mr. Alfred Cox, the Manager, gave evidence as to the condition of the works; and Mr. B. W. Bryan, Water Engineer and Director of the Company, confirmed his figures. Mr. J. A. Henoke, for the Assessment Committee, contended that the appellants had failed to prove their case. Criticizing Mr. Humphreys-Davies's valuation, he said dams were not perishable, and therefore it was absurd to take anything from a sinking fund in regard to them. Mains, too, would last vastly longer than twenty years, the period which Mr. Humphreys-Davies fixed. Mr. A. Body, surveyor, of Plymouth, and Mr. R. J. Low, rating surveyor, of London, were called to support the Assessment Committee's valuation. Mr. Body said that in arriving at his valuation he had put down £17,000 for renewals in forty years, but as a matter of fact the Company had spent only £11,000 on renewals and repairs in thirty-eight years. Mr. Low, who was called in to advise the Committee as to the rating of special hereditaments, said that he arrived at a gross value of £2524, and a net value of £1966. The Court, of which his Honour Judge Granger was Chairman, reserved judgment.

Liability of Water Consumers to Repair Communication-Pipes.

At the Westminster County Court, a few days ago, his Honour Judge Woodfall heard a case in which Florence Batt, a married woman residing at No. 23, Old Kent Road, S.E., claimed £50 damages from the Metropolitan Water Board for personal injuries sustained through the alleged negligence of their servants in permitting to remain in a defective condition, in the highway of Amery Place, Lambeth, a stopcock box or other water apparatus. The plaintiff's case was that in passing along Amery Place her foot caught in an open stopcock box, which caused her to fall and sustain injuries principally to her knee. Mr. Percy Simner, who appeared on her behalf, contended that the Board were liable for the condition of the box, which was without a lid, leaving a hole in the pavement. He cited as authorities the cases of *Osborn v. Metropolitan Water Board** and *Chapman v. Fylde Water-Works Company*.† Mr. Ross-Brown, for the defendants, submitted that they were not liable to maintain or repair apparatus which was not their property. There was a statutory obligation on the owner or occupier of the dwelling-house for whose convenience the stopcock box and communication-pipe were supplied to maintain them in proper repair. He relied mainly on sections 8 and 19 of the Board's Charges Act of 1907, and the judgment of Mr. Justice Phillimore in the action brought by Miss Stacey against the Gaslight and Coke Company, the Metropolitan Water Board, and others, tried in January last.‡ His Honour, in giving judgment, reviewed the facts; and, dealing with the arguments of Counsel, said he had arrived at the conclusion that the Board's Act of 1907 placed the obligation of repairing this apparatus on the owner or occupier, who had now power to open up the roadway if necessary for the purposes of repair. The Act applied, in his opinion, not only to new but to existing communication-pipes. He therefore gave judgment in favour of the defendants; but said that in the event of the plaintiff appealing with success, he would save the parties the expense of a new trial by assessing the damages at £30. On the application of Mr. Ross-Brown, his Honour gave the defendants the costs of the action.

* See "JOURNAL," Vol. CIX., p. 444. † *Ibid.*, Vol. LXIII., p. 813; and Vol. LXIV., p. 147. ‡ *Ibid.*, Vol. CIX., p. 185.

Complaint as to the Condition of a Gas-Testing Place.

At the Spelthorne Petty Sessions, on Monday last week, the Sunbury Gas Company were summoned, at the instance of the Sunbury Urban District Council, for failing to keep in repair and working order the place at their works for testing gas, and for not affording facilities to the Council's gas examiner for testing the gas supplied to the district. Mr. Attenborough, who prosecuted, said for some time there had been good reason to complain of the gas supplied to the people of Sunbury, and on the 11th of October an examiner visited the testing-place at the gas-works, and found not only the apparatus but the room in a dirty and neglected state. The examiner was engaged for four hours before he could complete his test; and, so far as he could make out, instead of the gas being 15-candle power, it was only a little over 9 candles. The inference from this state of things was that the Company were supplying gas to the public without taking the trouble to test its quality. Mr. P. Edgerton, one of the London County Council gas examiners, deposed to having visited the place, and finding it so dirty that, instead of making his test in one hour, it took him four hours. Witness, in cross-examination by Mr. Kenelm Preedy, who appeared for the Company, stated that during the whole of the time he had been gas examiner for the Council there had been complaints as to the state of the testing apparatus; and there was strong evidence that it had not been used for a long time. Mr. Preedy said he should show by the evidence he was going to call that every facility was given to the examiner for carrying out his test. Mr. T. Burtenshaw, a fitter in the employ of the Company, said the testing-room was littered rather than dirty. The photometer was dusty, but it was impossible to prevent dust getting into the room. Mr. Samuel Bark (the Company's Manager) denied that the testing-place was as dirty as was represented, and said he could have got it in order in ten minutes. He also said the Company tested the gas once or twice a week. Mr. James Foreman, official examiner to the Manchester Corporation, said he had examined the photometer, and with such slight adjustments as he always made a test could be easily carried out. The Bench thought the premises were not in a proper state when the gas examiner visited them; and they imposed a fine of £2 and £5 5s. costs.

Non-Provision of Cisterns to Closets.—At the Lambeth Police Court last Wednesday, before Mr. Hopkins, Mr. Francis Gillian, of Kellett Road, Brixton, was summoned by the Metropolitan Water Board for wilfully refusing or neglecting to comply with one of the regulations made under the Metropolis Water Act, 1871. Mr. Desmond Collins said the complaint was that there was no water-cistern attached to the closet at the defendant's house. Mr. Hopkins: Do you say the regulation is universally applied? Mr. Collins: All over London. Mr. Hopkins: And is also universally disregarded. Subsequently his Worship, turning to the Board's Solicitor, remarked: "You can't pick out the small householders and say 'We will treat you differently from the way that we treat our large customers.' There are hundreds of thousands of cases where the regulations are not complied with, and it is not attempted to enforce them." The defendant was ordered to pay the cost of the summons—2s.

Fire at Messrs. Willey and Co.'s Works.—Just before four o'clock on Thursday morning, an outbreak of fire occurred in the pattern-shop at the works of Messrs. Willey and Co., at Exeter. Within a short time of the report of the occurrence, the Fire Brigade arrived on the scene, and found that the origin of the fire was in the core-room, or casting-shop, that the place was fully alight, and that the flames had involved the pattern-shop, and were making their way towards the principal foundry. The buildings are mostly of corrugated iron, with open timbered roofs and glass skylights. The firemen checked the progress of the flames in an incredibly short space of time. We understand that the night watchman passed the place several times, but saw nothing to arouse his suspicions, until, in the early morning, when near the meter-shop, he discovered a bright light in the casting-shop, and soon the whole place seemed to burst into flames. The material loss in the building, &c., is put at about £2000; but the more serious trouble is in the replacing of the patterns, which, as a member of the firm said, were invaluable. It is thought that the fire was caused by the spontaneous combustion of plumbago or charcoal, of which there was a quantity in the building.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Annual General Meeting of the Association was held on Monday last week at the Westminster Palace Hotel, S.W.—Mr. H. E. Jones in the chair.

The following is taken from the register of those in attendance, in the order of signature: H. E. Jones (*Chairman*); W. F. Cotton, of Dublin; Edward Allen, of Liverpool; D. H. Helps, of Reading; Thomas May, of Richmond; William King, Brentford Gas Company; R. O. Paterson, of Cheltenham; W. R. Phillips, of Hitchin; George Andrews, of Swansea; George Clarry, of Cardiff; S. Y. Shoubridge, of the South Suburban Gas Company; Hanbury Thomas, of Sheffield; H. Hart, of Canterbury; William Mann, of Brentford; T. H. Hazell, of Newport, Mon.; C. H. Batten, of Northampton; R. W. Edwards, of Aldershot; T. H. Duxbury, of South Shields; H. Kendrick, of Stretford; A. Easton, of Faversham; G. A. Eunson, of Northampton; F. W. Cross, of Lea Bridge; John T. Jolliffe, of Ipswich; Chas. W. Braine, of Wandsworth; H. A. Stibbs, of Portsmouth; W. W. Topley, of Croydon; E. Topley, of Tottenham; J. R. H. Jacobs, of Southampton; J. W. Bucklev, of Hornsey; W. E. Roberts, of Hornsey; Stanley C. Sherrard, of Kingston-on-Thames; and Robt. Hall, of Matlock.

Annual Report of Committee.

The Secretary (Mr. Fred. E. Cooper) read the minutes of the last meeting, and the following report of the Committee:

The Committee herewith submit the revenue account and balance-sheet for the year ending October, 1910, and a report of the proceedings of the Association during that period.

The revenue account shows that the year's receipts were £512 18s. 6d., and the expenditure £488 13s. 9d.; thus leaving a credit balance on the year's working of £24 4s. 9d.

The balance-sheet shows that the Association's assets amount to £1992 3s. 6d., which is represented by £1690 16s. 2d. of 2½ per cent. consolidated stock at cost price—viz., £1522 11s.; balance at bank, £465 6s. 2d.; cash in hand, £4 6s. 4d.

It will be remembered that at the last annual general meeting, it was reported that the Committee were taking steps with reference to the promotion of a Bill enabling gas companies joining in such promotion to adopt the "Metropolitan" Argand Burner (No. 2) in substitution for the burner prescribed by such companies' Acts or Orders.

The Committee are pleased to report that, as a result of such action on their part, 47 companies, representing 49 undertakings, decided to join in the promotion of the proposed Bill.

A Committee, consisting of the members of the Committee of this Association and certain elected representatives of the companies promoting the Bill, was appointed to take charge of the conduct of the Bill during its passage through Parliament.

The number of companies joining in the promotion being so large, it was considered desirable to confer with the authorities of the House of Commons as to the mode of procedure to be adopted; and it was ultimately decided that three Bills should be promoted.

The Bills encountered considerable opposition, being strongly opposed in Committee in the House of Lords, in which House they were introduced, and subsequently on second reading and in Committee of the House of Commons. They now stand for consideration in the House of Commons, where notices for the rejection of the Bills at that stage have been given.

It is generally felt that opposition to the remaining purely formal stages of the Bills, after the unanimous decision of two Committees of Parliament that the preambles were proved, is to be regretted, and there is no justification for the vexatious delay and unnecessary expense caused by the continued opposition.

The Bills have the support of the Government; and, under all the circumstances, the Committee do not think there can be any doubt as to the result of the opposition on the consideration stage, and confidently anticipate that the Bills will eventually pass into law.

At the same time, your Committee appeal to every representative of the gas industry, whether interested as promoters or not, to use any influence they may have with Members of Parliament to secure their favourable support for the Bills at the further opposed stages.

Respecting the circular issued by the Inland Revenue authorities as to the future disallowance for income-tax purposes of depreciation on gas plant, referred to in the last report, the Committee have had considerable correspondence with the Inland Revenue Authorities and representatives of gas companies upon the subject. Ultimately a letter has been received from the Board of Inland Revenue stating that the Board considered the scheme referred to in that circular afforded the simplest method for allowing depreciation to gas companies, but that it was not the desire or intention of the Board by that circular to remove the question from the jurisdiction of the District Commissioners of Taxes who make the assessments.

It would thus appear that, while the circular in question is an emphatic direction to Surveyors of Taxes not in future to allow a deduction for depreciation, the District Commissioners are left at liberty to allow such depreciation if appeal be made to them to do so. The Committee consider this a very unsatisfactory position of the matter, and advise that companies should insist upon an allowance for depreciation being made as in former years.

The Committee have considered the Finance (1909-1910) Act, 1910, and the forms issued thereunder, as regards their applicability to statutory gas companies, as defined by the Act; and they are of opinion that Form 4 is not applicable to such companies, and that if they can be required to make any return upon the forms purporting to be issued under the Act (as to which, the question being *sub judice*, they express no opinion), the only form they can be required to fill up is Form 3.

The Committee are aware that steps are being taken by local authorities owning electrical undertakings for the promotion of a Joint Bill in the ensuing session of Parliament for the purpose of enabling such authorities to wire consumers' premises, and to supply them with electrical fittings, &c. The Committee are closely watching the matter with a view of taking such concerted action with reference thereto as may be necessary.

The only Bill adversely affecting the interests of gas companies introduced into Parliament during the present session was the Engines and Boilers (Persons in Charge) Bill, which, however, was not proceeded with.

The principal matters upon which the Secretary has been consulted during the last year are as follows:—

Information to be supplied by gas companies for poor-law assessment purposes.
Best mode of dealing with excess of profits.
Right to demand supply of gas for "stand-by" purposes.
Liability of gas company for gas explosion.
Legality of collection by local authorities owning electrical undertakings of moneys due to contractors for electrical apparatus supplied.
Gas company's right to damages in respect of breakage and excessive leakage of mains in colliery districts.
Questions in reference to income-tax.
Right of local authority owning electrical undertaking to let motors out on hire.
Right of gas company to supply gas outside company's limits.
Right of local authority to enforce bye-law as to depth at which mains should be laid.
Supply of gas by local authority through meter situate within their limits, to house situate in gas company's area.
Questions arising under Finance (1909-1910) Act, 1910.

The Committee are pleased to say that nine members joined the Association this year, which brings the total number of members up to 117.

The Committee record with regret that Mr. A. G. Snelgrove, who has been a member of the Committee since the formation of the Association, has resigned his membership in consequence of the absorption of the West Ham Gas Company by the Gaslight and Coke Company. In accordance with Rule 9, the Committee have appointed Mr. George Andrews, Engineer and Manager of the Swansea Gaslight Company, a member of the Committee in Mr. Snelgrove's place.

The following gentlemen retire from the Committee in accordance with Rule 9: Mr. William Belton (Shrewsbury Gaslight Company), Mr. W. F. Cotton (Alliance and Dublin Consumers' Gas Company), Mr. Thomas May (Richmond Gas Company), Mr. S. Y. Shoubridge (South Suburban Gas Company), Mr. Hanbury Thomas (Sheffield United Gas Company), and Mr. Corbet Woodall (Gaslight and Coke Company)—all of whom, being eligible, offer themselves for re-election.

Standard Burner Bills.

The Chairman said it became his duty to move the adoption of the report and accounts. He did not think that, in the whole history of the Association, the Committee had ever had quite such a strenuous period as they had passed through since the members of the Association last met. On that occasion the Committee obtained authority for that very important action, the promotion of a Bill for the alteration of the standard test-burner in the cases (as the event showed) of 47 different gas companies. All the members were in the habit of following the Technical Press in regard to these matters; and so they must have observed the struggles, battles, and successes in the fresh encounters with the old foe. He thought the Committee would have the sympathy, if not the gratitude, of the members of the Association for the time they had had. But even now it would not do for them to say too much, because they were not really through the woods with these Bills. Gas companies were not the most popular people in the world; and they had sometimes curious tribunals to face. Therefore to those who were fighting an uphill game, it was extremely satisfactory to find the decision of the House of Lords Committee (which was presided over by a most capable gentleman, who went thoroughly into the matter) was given by them with absolute unanimity in connection with this act of justice—for it was really nothing less—to the companies concerned. In the House of Commons, too, they had a most persistent and exhaustive inquiry into the whole matter. The Chairman of the Committee showed infinite patience and great perspicacity throughout the proceedings; and the individual members of the Committee were quite as careful as their Chairman. Some of the evidence that was tendered, however, was almost painful to listen to, because the *bona fides* of gentlemen who conducted gas undertakings were attacked. At any rate, it was painful to him, a veteran in the gas industry, to listen to it; for in the course of his long career, he had not had experience of this sort of thing. However, the decision of the Commons Committee was in favour of the Bills; but after that, they had the unusual spectacle of private members in the House delaying the further progress of the Bills, and asking for additional alterations or the entire rejection of the measures. But, thank goodness, the British Parliament and British methods had not yet descended to irregular guerilla tactics of this sort; and the Government were bound to stand by the Committees to whom the House referred the Bills. The House of Commons must be loyal to itself; and he had not a shred of doubt himself that, when the House came, in cooler moments, to consider the decision of the Committee who sat to hear the case for and against the Bill, and who gave it every possible attention (as was shown by the voluminous report of the evidence), there would be no diverting or upsetting of the position of the matter as it now stood. The Committee of the Association trusted that the question might now be considered to be disposed of. They must not, however, be too certain; and it would be well for the members to individually urge upon their parliamentary representatives in every town the extreme iniquity of continuing to impose upon the 47 companies concerned a condition of things that had been removed from the larger and most important gas undertakings in the kingdom, and which represented a good proportion of the total of undertakings. This was a small argument which might convince any impartially minded man on the subject.

Income-tax Allowance for Depreciation.

Then the report dealt with the question of income-tax allowance for depreciation. He had had some special experience in relation to this matter; and he could reiterate what the report advised, that they should insist in going past the collectors, and go direct to the Commissioners. For he was sure when they went before the capable gentlemen who settled all these matters, and pointed out the very destructible character of the fittings, meters, and stoves, and particularly of the slot-meter fittings, and the amount of money that had to be spent to keep them in proper order, there would be no difficulty in satisfying the Commissioners that an allowance should be made in regard to these things. In the case of gasholders, 2 per cent. of their structural value was allowed for depreciation. It had been a fixed principle to allow this, because they were obviously things that must be depreciating, and could not be repaired year by year, and so had to be repaired once in (say) thirty or forty years. If they "stuck to their guns," he thought the Commissioners would listen to them, and it would be quite easy to assure them. If not, they must bring some specialized accountant to their aid, or perhaps the accountant of the company in question would

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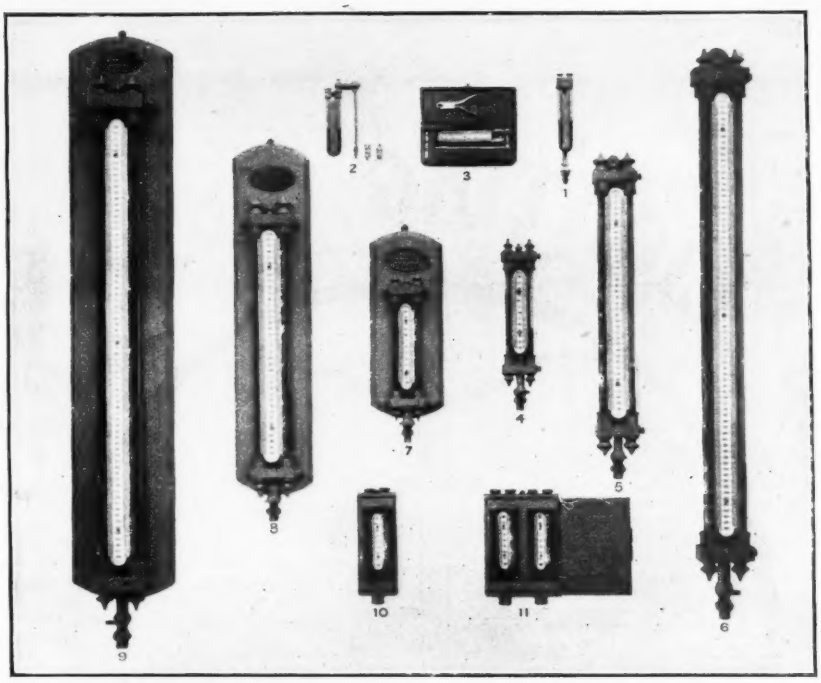

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be able to show the Commissioners the logic of the matter, which was really an extremely simple one. In London there had been some correspondence on the subject. The great Gas Companies of London and the Brentford Gas Company, however, had their accounts specially audited by an auditor of the Board of Trade. He was a man of distinguished position from the Government office; and he was authorized to deal with these questions as a matter of principle, as well as a matter of accuracy of account. When the accounts had passed him, the Income-Tax Commissioners accepted the position.

THE LAND TAXES.

Regarding the land taxes, and the much-discussed Form 4, it was seen that, in one part of the Act, gas-works were exempted. There was only one connection in which gas companies would have to pay, and that was when, if ever, they sold a piece of land for which they had no further use at a higher price than they gave for it.

MISCELLANEOUS MATTERS.

As to the questions that had been addressed to the Secretary by members, their Secretary must be a gentleman of Machiavelian skill if he could satisfactorily settle all these matters as they should be, because the questions addressed to him seemed to reach in character from Dan to Beersheba. But it was merely for him to give his opinion as to how far they would have to defend their rights at law. In respect of the membership, they had increased their number by nine; and he thought it ought to increase very much more, having regard to the very useful work the organization had done in the past. There were the Sulphur and the Standard Burner Bills. If anyone had any doubts as to belonging to the Association, those doubts must be removed by a consideration of the advantages that had been conferred by the work accomplished by the Association. Therefore he hoped that by next year he would see the number go up very much beyond the 117 at which it stood now. Mr. Snelgrove having retired, the Committee remembered the very handsome and modest manner in which Mr. Andrews retired from the contest last year; and he thought they had been most wise in taking this opportunity of getting him to join their body. They were happy to see him in this position. As to the re-election of the retiring members, they were all stalwarts—all men whom it was a pride and a pleasure to meet and to be associated with. Looking at the names of those who retired, and who were offering themselves for re-election, it would be agreed that they had a good Committee. The greatest gas man in the world—Mr. Corbet Woodall—happened to be (through alphabetical arrangement) at the bottom of the list. [Laughter.] At the top was Mr. William Belton, of Shrewsbury. Then there was Alderman W. F. Cotton, of the Alliance and Dublin Consumers' Gas Company, who had had a good struggle and fight over the standard burner, and had won. Then there was Mr. Thomas May, Mr. S. Y. Shoubridge, and Mr. Hanbury Thomas, who at Sheffield sold the cheapest gas in the country—or rather there was one other authority who claimed to sell cheaper, but perhaps it was not as good. Then there was Mr. Woodall, who he regretted was unable to be present. He was a gentleman who figured in the conspicuous position of Governor of the largest Gas Company in the world. He never failed when anything had to be done, or money spent, to acquire anything useful or proper for gas companies. He was always in the right place, and acted in the right way, and got his Company to move in the proper spirit in all matters in which progress was concerned. With these remarks, he desired to move the adoption of the report and accounts.

Alderman W. F. COTTON (Dublin) seconded the motion.

Alderman HART (Canterbury) remarked, regarding the series of questions answered by their Secretary, that he did not know whether or not it would be advisable that they should have in the report in future some of the answers that were given. To say the least, they would be enlightening to those belonging to other gas companies. He did not know whether it would be prudent or discreet to publish the whole of the answers; but he simply threw out the suggestion.

Mr. T. H. HAZELL (Newport) suggested the publishing of the Committee's report, together with the balance-sheet, a short time before the meeting, so that any particular question that might have been asked by any particular company in connection with their own special affairs could, possibly advantageously, be dilated upon by those present at the meeting. He did not know whether there were any difficulties in the way; but he could readily see that the report would be far more interesting to the members who attended the meeting if they had the privilege of reading it beforehand, and so placing themselves in a position to discuss it. He also commented on the fact that the investment in Consols in the balance-sheet had not been written-down; and, proceeding, he expressed gratification at the course taken by the Committee in appointing Mr. Andrews a member of the Committee, after the handsome attitude he adopted at the last meeting. There were one or two matters in the report in regard to which the expressions used might have been a little more forcible. Perhaps, however, the Committee were wise in not giving full expression to their feelings in respect of the famous circular issued by the Inland Revenue Department. The circular was absolutely illogical; and they had no right to issue it. It was issued to the collectors; while the whole matter rested with the Commissioners themselves. It was a positive fact that the circular was issued without any discussion with, or obtaining information from, any representatives of gas companies. What was done was to take the views of corporations owning both gas and electric light works as representing the views of gas companies throughout the kingdom. Therefore it followed naturally that depreciation was allowed for electricity works, but none at all for gas-works. Thus it was suggested that they should go on new lines altogether, and lines that meant more difficulty, with less satisfactory results. He also congratulated the Committee, the officials, and the local representatives of the Association concerned upon the remarkable success that had attended their efforts on behalf of the companies who promoted the Standard Burner Bills. It had been a complete success from start to finish; and the whole management of the matter reflected the greatest credit on those who initiated the movement, and those who were afterwards successful in carrying it through.

Alderman COTTON expressed the opinion that it would be a mistake to publish the correspondence with their Secretary, more especially seeing that any member who wrote to the Secretary on a particular subject could get the information he desired.

Mr. R. W. EDWARDS (Aldershot) suggested that, instead of printing the replies *in extenso*, they should be printed in abstract. He thought this would be of the utmost value to gas companies, and possibly at times obviate troubling the Secretary unnecessarily. With regard to the land taxes and Forms 4 and 3, he was rather surprised that some of the members had been troubled with Form 4. He had not been, as it was obvious that no gas company need be bothered by it. He also associated himself with the congratulations expressed in reference to the Standard Burner Bills. He hoped as they had gone on, so they would finish, and that those companies who were incorporated in the Bills would receive the justice which was their due.

Mr. H. KENDRICK (Stretford) supported the suggestion regarding the publishing of an abstract of the replies of their Secretary to the questions addressed to him. There was one point in the correspondence that appealed to many of them; and it would be just as well if the members generally had the information in their hands as well as the members of the Committee and those companies who had applied for it. He referred to the question of stand-by meters. Many of them were taking steps of their own in this matter, which steps might not be legal if put to the test. Therefore, information such as that which had been given to one or two members by the Secretary would be very useful to others. He also complimented the Committee on the success that had attended their work during the past year.

The CHAIRMAN, in reply, said the Committee would take into the fullest consideration what seemed to be a general wish, that the report and accounts should be circulated a little before the meeting. He did not think the Committee would find much difficulty in doing something in this direction. As to the suggestion of Alderman Hart respecting the publication of the correspondence with the Secretary, it seemed to many of those present that the gist of it might be printed, though all the answers might not fit the circumstances of different cases. However, to that, too, he would promise the fullest consideration on the part of the Committee. The Committee were much obliged to the members for indicating the lines on which they desired to be better informed. He admitted, in reference to the remarks of Mr. Hazell, that they were a little out of the ordinary actuarial practice in not having their assets revalued. In connection with this matter, it was interesting to notice that, since the advent of a certain important gentleman as Chancellor of the Exchequer, while gilt-edged securities had gone down, gas stocks had gone up. However, the Committee would also take into consideration the question of the revaluation of the investments. There was this point upon the accounts, that had it not been for the special contribution towards the promotion of the Bills for the standard burner, the "profits" would have been £224 this year; and therefore the contingency of having to draw upon their reserve was rather remote. He hoped that some other gentleman would come to the front as Chancellor of the Exchequer, and that then England might recover her credit, and advance the position of these public investments. These were national funds; and what had happened to them was a deplorable thing.

The motion was unanimously adopted.

RE-ELECTION OF RETIRING MEMBERS OF COMMITTEE.

Proposed by the CHAIRMAN, and seconded by Mr. J. T. JOLLIFFE (Ipswich), retiring members of the Committee—see report—were re-elected.

MUNICIPAL ELECTRIC WIRING AND FITTINGS.

Mr. ROBERT HALL (Matlock) said that perhaps it would be better that he should preface the remarks he had to make by suggesting that, although he was present mainly on behalf of another Association, he was entitled by the positions he occupied to attend the meeting. He was a Director of two gas companies, and was officially connected with three others; so that he came to the meeting full of sympathy, and with a good deal of knowledge of the gas business. The immediate purpose, however, for which he had come to the meeting was on behalf of the Incorporated Association of Ironmongers. Last year a Bill was promoted, one of the purposes of which was to enable corporations with electrical undertakings to provide free wiring and also to sell electrical goods at such prices as they thought fit. Now that was regarded by the members of the Association of Ironmongers as very prejudicial to them, because a great many of them were interested in the electrical industry, and were regularly employed in it carrying out electrical wiring, and so on. In towns where the members carried on this business, they felt it would be a most serious thing to them if the clause in the Bill went through. So his Association, in connection with the Electrical Contractors' Association, had opposed, and successfully opposed, the proposed power. It was a matter of surprise, and of some concern, to them that the clause, which was intended mainly as an attack on the gas industry, was not in any way opposed by the Gas Companies' Protection Association, or (for that matter) by any other gas organization. This year the Incorporated Municipal Electrical Association were promoting something on the same lines, and were bringing forward the same proposals, and some sixty corporations had assented to, and were supporting, the proposal. In all probability, therefore, the fight next session would be severer than before. The electrical people felt stronger on this question than they did a year ago, because, in the meantime, the Leicester Corporation case had been before the Courts. In that it was decided that corporations, unless they had special powers in their Acts, could not provide electrical fittings free or deal in them. This decision had spurred up the local authorities more than ever; and the result would no doubt be a more determined fight. The "common enemy" which the Municipal Electrical Association were fighting was gas. He therefore came before the Gas Companies' Protection Association that day with a good deal of confidence, asking that, if these proposals were brought forward again during the coming session, the Association should take their part in opposing them. The gas industry would be harder hit than any one. If the Ironmongers' Association could take up this question, surely it was the duty of an Association which was for the protection of gas companies to be in the forefront of the battle, and defeat what had been defeated before, and what, on the justice of the case, he believed would

be defeated again. As to the exact form the proposals would take, he was unable to say at present, because the Bill had not been published. There was no doubt whatever that, whether or not the wording was the same, the proposals would take the same lines as those of last session. His appeal really was that the Association should decide, on broad grounds that, if this proposal did come forward, they would take their part in opposing it strongly. The Association that he represented, and of which for the time being he was the President, really could not undertake to fight the proposals again single-handed. The Gas Companies' Protection Association were a far more wealthy body than the Ironmongers' Association, though not so numerous. They did therefore feel strongly that the burden ought to lie on this Association and not on the Ironmongers' Association. They, however, were ready to do their part and their utmost, and to use their influence in every town all over the country to resist the Bill; but they wanted at the same time to feel that the gas industry which was most affected should also take part in the struggle. He asked, then, that the Association should give some indication that, if the proposals took the form they did a year ago, the Association would take their part in opposing them.

The CHAIRMAN said he could assure Mr. Hall that the Committee needed no urging in any way in reference to this particular question. But it must be remembered that they were rivals in trade with the electricity supply bodies. Gas people were fighting for their gas; and the electricity people were fighting for their electricity. Gas companies were themselves doing "free wiring;" and Parliament had shown great disinclination to give them *locus standi* where they were opposing electricity suppliers in doing something similar to that which they were doing for gas. The effectiveness with which the Association could spend money on these lines was really much less than the effectiveness with which the Ironmongers' Association could spend money on their lines, because the members of the latter were private individuals, private traders, and ratepayers, and they were the sufferers. To show that the Committee did not need any urging in this matter, he might say that it had been discussed by them that day; and the Committee were prepared to take into consideration the whole question, and to take action in some shape or other as might suggest itself upon discussion. The matter was down for consideration at the next meeting of the Committee. The members needed no assurance that the Committee did see the evil, the mischief, and the impropriety of the rates being collected out of the pockets of the ironmongers, and then being spent in depriving them of the opportunity of making a living. There was the further consideration that, when the ironmongers or any other private traders made losses in their business, they had to bear them; but when local authorities made losses and mistakes (as they were constantly doing) in running their electricity undertakings, they simply made them good from the pockets of the ratepayers. This was a grievance that Mr. Alderman Cotton (Dublin) had brought before the Association from time to time. It was perfectly infamous the way gas companies were put to disadvantage in the matter of public lighting, and the way deficits were made good out of the rates; while in nearly every town next to the railway company, and perhaps in cases before the railway company, the gas companies were the largest ratepayers. The Committee were not ignorant in this matter, or adverse to taking any open course; but it was a difficult thing for gas companies, *quâ* gas companies, to get into opposition as ratepayers, because they were always liable to the imputation that they were rival traders. This was what was levelled at them in these particular oppositions, over which, by the way, some of the larger companies spent considerable sums of money. However, the Committee would give Mr. Hall's proposal every consideration.

Alderman HART said he had watched this matter with considerable dissatisfaction, because from the position he occupied he had seen how the electricity supply business was operated, and how the returns were bolstered up. The manner of doing business increased the taxation of the gas company, who in Canterbury were the largest ratepayers. They therefore felt that the Corporation did these things at their expense—at the expense of the shareholders, the gas consumers, and the ratepayers.

Ironmongers and Gas Companies.

Mr. HALL said there was another matter he should like to bring forward. It was as to the great desirability of gas companies more generally entering into a working arrangement with ironmongers such as had been done at Croydon, Southport, and other places.

The CHAIRMAN said he quite sympathized with Mr. Hall's object; but really that was travelling outside the orbit and limits of the objects of the Association. But before he sat down, he should like to tell the ironmongers this, that they had brought the position upon themselves so far as gas fittings and stoves were concerned. Until gas companies took up the business of the supply of fittings and stoves, all that ironmongers did was to show two or three fossilized stoves and a few antiquated fittings, and nothing more was done, If ironmongers had been more far-seeing, and had been broader minded, and had looked ahead, what had happened would never have occurred. He was associated with 32 gas undertakings; and he always wanted to see the gas-fitting they had to put into houses done by other people. They only wanted to get it done properly.

Mr. HALL said he had been spurred in regard to this question by what appeared in the Presidential Address of Mr. James W. Helps at the last meeting of the Institution of Gas Engineers. In that address, he indicated the desirability of cultivating better relations with ironmongers. Mr. Helps spoke with knowledge and experience; and that rather encouraged him to bring the matter forward on this occasion.

The Scope of the Association.

Mr. T. H. DUXBURY (South Shields) asked whether there was an Emergency Committee in connection with the Association.

The CHAIRMAN: Yes.

Mr. DUXBURY: Thank you, Sir. Then can you intimate to-day the Committee's views on the grievance which has been lodged by the South Shields Gas Company?

The CHAIRMAN said the Committee felt every sympathy with the South Shields Gas Company in respect of certain representations made in South Shields, which did not fairly and properly give certain statistical facts connected with the London Gas Companies. But the Committee had no power or control over, or special knowledge of, those facts; and they felt they could not enter into correspondence with people in South Shields or anywhere else on such a matter. It was one of those domestic questions that must be dealt with locally.

Mr. DUXBURY said, in view of that answer, he was instructed to ventilate the grievance at the meeting, because his Directors did not consider the matter referred to was a local question.

The CHAIRMAN: Give us the principal heads of the grievance.

Mr. DUXBURY said that a letter appeared, among many other papers in the country, in the "Shields Gazette" from the Chairman of the Electricity Publicity Committee. That letter, he understood, was sent out to a very large number of newspapers throughout the country; and it inferred that London was to-day an electrically lighted city. The letter had been quoted in the Technical Press, and therefore many of the members present had seen it. The letter, as he had said, appeared in the "Shields Gazette;" and inasmuch as the South Shields Corporation had at the present time under consideration an improved lighting scheme for the main thoroughfares, the Gas Company considered the letter was apt to be to their detriment, because the inference was absolutely misleading. The Company therefore took steps to obtain figures to controvert the statement that had been made, and from them a reply was prepared to the letter. When this had been done, his Directors thought that perhaps the letter, dealing as it did on broad and general lines with the matter, could be sent from the Association to the local paper. Such a course would have had more weight than if the letter was sent by the South Shields Company or any of its officers. The statement was therefore forwarded to the Secretary with a suggestion that the Company would like the letter sent to the "Shields Gazette" officially from the Association. They had a courteous reply to the effect that the matter could not be dealt with, except by the express instructions of the Committee. But the Committee were not then meeting for about three weeks. Meantime, the Corporation were having a meeting; and it was essential that something should appear in the local paper. Therefore, the Company arranged for the letter to be published; and this had been done. The letter made no reference to the public lighting of South Shields whatever. The copy sent to the Secretary was typewritten; and he would have had nothing to do but to corroborate it.

The CHAIRMAN remarked that he could not see why Mr. Duxbury wanted to go about this business such a long way round. He got the particulars from London, had them in South Shields, and wanted them published in the Shields paper. Their Secretary could not add anything to the particulars.

Mr. DUXBURY: It was considered that the letter would have had much more weight coming from the Association than from the South Shields Gas Company.

The CHAIRMAN: If we dealt with such a matter as this, we might be asked to deal with a lot of correspondence.

Mr. DUXBURY: This was a general letter on a matter of general interest to the whole gas industry. Our grievance is that it would have taken the Committee three weeks to deal with this matter from the time we sent the letter; and, further, we think the letter, being on a matter of general interest to the members, might have been sent from the Association.

The CHAIRMAN: The Secretary says the period to the date of the Committee meeting was ten days, not three weeks; and the Committee considered the letter was quite outside the ordinary duties of the Secretary.

Mr. DUXBURY: The Secretary certainly did not tell me that in the correspondence.

The CHAIRMAN: Do you, gentlemen, think the Secretary should write letters to the newspapers on such topics as the public lighting of London. [SEVERAL MEMBERS: No, no.] If the Secretary had undertaken this, I should have wanted to know where the Association were drifting to.

Mr. DUXBURY: The letter from the Chairman of the Electricity Publicity Committee was published in almost all the principal towns in England; and I submit the Association ought to have helped the gas industry by sending out a letter controverting the statements.

The CHAIRMAN: All I can say is, the Committee do not agree with that view. This is a matter that must be left to the Committee.

Mr. R. W. EDWARDS observed that the matter raised by Mr. Duxbury must have produced the suggestion in more minds than his own as to whether the scope of the Association was wide enough to deal with all the matters that the members wanted it to take up.

Mr. H. KENDRICK: It seems to me the difference between Mr. Duxbury and the Committee is that he desires to make a national affair of this, while the Committee regard it as a local matter.

Mr. DUXBURY: The letter of the Electricity Publicity Committee was forwarded to newspapers all over the country; and an answer to it ought to have been sent out in the same way. I understand from you, Sir, that the Committee consider this matter to be outside the scope of the Association?

The CHAIRMAN: Yes, as to that particular work. If you wish the scope of the Association enlarged, you must give notice of it, and let us discuss it on some other point, but not on the point of a grievance.

Mr. DUXBURY: This is called the Gas Companies' Protection Association. My construction of this title is that, when a gas company are in trouble, they can apply to the Association for advice and help. I should have thought that such a simple matter as this could have been covered without extending the scope of the Association.

The CHAIRMAN: You may ask for any advice you think fit, but not request us to write letters to the general newspapers.

Alderman HART expressed the opinion that it was not a reasonable thing to require the Secretary to put his name to such a letter, however creditable and true, in the name of the Association; and he thought the Secretary acted wisely in saying that he must refer the matter to the Committee.

Mr. DUXBURY: It seems to me that if the scope of the Association does not cover what I wanted, it ought to be enlarged.

The CHAIRMAN: It is all a question as to what is the reasonable scope of usefulness of the Association.

The matter then dropped.

DANISH GAS COMPANY.

The Annual Meeting of the Company was held last Tuesday, at Millbank House, Westminster, S.W.—Mr. CORBET WOODALL in the chair.

The LONDON AGENT (Mr. H. G. Warren) read the notice convening the meeting; and the Directors' report and accounts were taken as read.

FINANCIAL AND WORKING RESULTS.

The CHAIRMAN, in moving the adoption of the report and accounts, said he must congratulate the shareholders upon another year of satisfactory trading. As the shareholders were aware, the profit balance from Randers which was included last year was not available in the present accounts; but, notwithstanding, there was a larger balance by £4000 than last year. In the year to June, 1909, an exceptional amount of money was spent upon repairs and special renewals; and the price of coal was also above the average. On this occasion, advantage was reaped from the lower price of coal, and from the renewals being less. The residuals had brought in less revenue by £9900; and the sale of gas, due to the loss of Randers, had been less by 27 million cubic feet than the year before—this representing an amount of £6000 in revenue. Still, on balance, they had £4000 to the good. Had the supply of Randers remained with the Company, instead of a deficiency in comparison with the preceding year, they would have had an increase of 2½ per cent. in the consumption of gas. The number of meters in use was now 77,067, or 2877 more than it was last year, although the Randers meters had all been wiped out. The loss in exchange had been £672 in excess of the previous year, owing to there having been more money transmitted to England. The amount transferred to reserve and redemption account was the same as in the preceding year—viz., £13,000. The balance available for dividend was £82,684. If the dividend and bonus which the Directors recommended be approved, they would, when added to the interim dividend already paid, absorb £43,500, and leave £39,184 to be carried forward. The corresponding figure at the end of the previous year was £36,758.

CAPITAL EXPENDITURE AND DEPRECIATION.

The capital expenditure during the year had been £51,993. This included further outlay upon the new works at Flensburg of £37,800; on gasholders at Assens and Elsinore, £7140; and upon mains, meters, lamps, and works of distribution generally, £8500. Against this addition to capital, the Directors had written off £40,000—the loss which they estimated as having been incurred by the shutting-down of the old gas-works at Flensburg, and also £5960 on account of depreciation in the value of meters. The latter had arisen in this way. The meters stood, as a matter of course, in the accounts at the price at which they were bought, less a certain amount of depreciation. But since they were purchased, the tendency of the price of meters had been downwards; and so the Board had dealt with them by bringing them down to a price at which they could now be bought, less 40 per cent. for depreciation. The net addition to capital on the year was thus reduced to £6032. The expended capital per million cubic feet of gas sold was now £696, as against £675 last year. The increase was due to the further amount spent at Flensburg, which was still unproductive, and to the falling off in the quantity of gas sold owing to the loss of Randers. There had been spent on the new works at Flensburg £88,594; and they were now so nearly complete that he (the Chairman) contemplated, in the course of a fortnight or three weeks, helping the Burgomaster of Flensburg to charge the first retorts. It would be seen from the balance-sheet that, while the fire insurance fund had been increased by £1307, the reserve and redemption account was less by £27,000. The latter sum was the balance between the amounts carried to the redemption fund and that written off, as he had explained, for the Flensburg old works and for meters.

A PROSPECTIVE TRANSFER.

At the close of this year, the Company's contract with the town of Aalborg came to an end, and the supply of gas would be taken over by the Municipal Council. The works, mains, and other property belonging to the Company there had been valued by the Arbitrators; but the amount of their award had not as yet reached the Board. They had no reason to doubt that the sum accumulated to the credit of Aalborg in the redemption and reserve fund would cover such depreciation from the book value as the Arbitrators might think well to deduct. The Company would retain a valuable building estate in Aalborg for future disposal. Their position at the present time was more than usually interesting by reason of the maturing of contracts; but it contained no element to cause alarm. The Directors would, as they had done in the past, use every effort to secure the renewal of contracts; and they hoped to succeed. Meantime, it had been with much regret that they had lost such towns as Randers and Aalborg. The compensation paid to the Company on transfer was for works, including land, mains, and all other assets, but excluding goodwill. The property was valued not at cost, but subject to depreciation. The redemption account had been accumulated with the object of meeting this depreciation. In the case of Randers, they had a larger sum than was necessary for this purpose; and, as he had said, the Directors confidently expected this would be the case at Aalborg. He might explain that the scheme of redemption or amortization was calculated to return not only the nominal, but rather more than the market, value of the shareholders' stock. The value had been taken at £150 per cent. The Company incurred no risk therefore in purchasing ordinary shares at a price less than that rate.

NEW CONTRACTS.

In addition to the contract for the supply of water to Tikjob, as already reported, the Directors had completed an agreement with another district, called Asminderod-Gronholt, on the Strandvei—both giving a monopoly for 35 years for gas and water. They were also considering the purchase of the works of the Horsholm Gas Company. If this were effected, they would have a continuous line of supply from Copenhagen to Elsinore.

STRONG RESERVE AND DEPRECIATION FUND.

The position of the reserve and depreciation fund to-day was, in his opinion, evidence that the principles on which it was founded were sound. In 1908, before the loss of Randers, the total accumulation was £224,514. In 1909, after making good the Randers loss, it was £228,884—an increase of more than £4000. That was to say, they carried into the redemption fund £4000 more than was necessary to make up the loss on the transfer of Randers. Now, after writing off £40,000 on account of the abandoned works at Flensburg, the fund stood at £201,868. So it had come down by only £27,000, against the £40,000, *plus* the £6000 for meters. In addition to the £13,000 taken from profit and loss to the credit of the redemption fund, it had, of course, benefited automatically by the interest received from the sum invested outside the Company, and by the dividend on £35,000 which they had invested in the Company's own shares. Without further preface, he moved the resolution for the adoption of the report and accounts.

Lieut.-Col. T. H. LEWIN seconded the motion.

Mr. ALEX. BAIRD said he rose to express the feelings of satisfaction, which, he was sure, all the shareholders must experience, in having such an excellent report and balance-sheet laid before them, and in listening, as they always did, with pleasure to the interesting and instructive remarks from the Chairman in explanation of the various items in the report, and in giving a general survey of the Company's position. It was always a pleasing feature of a balance-sheet to find that the net balance was larger than it ever was before; and it was all the more gratifying on this occasion when they had experienced the loss of such a profitable concession as Randers. He hoped that the consequent reduction in the consumption of gas was only temporary, and might speedily be compensated by an increased demand in other directions. He need scarcely say that, while year by year they saw considerable additions made to the capital account in extensions and other outlays (which were always features in successful gas undertakings), it was satisfactory to find that at the same time reductions were being made upon the capital account as concessions fell in. This happened last year on account of Randers, and had again this year on account of Flensburg. There is one point that was not quite clear to him—that was, the distinction made in dealing with this transaction last year and this. The Randers amount was deducted from capital only; while the Flensburg item had been deducted from capital and from the redemption account—leaving the financial position of the Company practically the same. He had no doubt the Chairman would be able to give the shareholders a sufficient explanation of this. It was satisfactory to find that the transfer of £45,000 in reduction of the redemption account had in no way affected the sum standing to the credit of the investment account, which now amounted to £123,000, being an increase of £8000 over last year. He did not intend to repeat the arguments which he had used on previous occasions as to the desirability, on the grounds of safety and sound finance, of placing the whole of the amounts added to the reserve and redemption account in investments outside the business so as to be available to be called upon in case of emergency. The Chairman was good enough to inform him on the last occasion of their meeting that these views had received every consideration by the Board; and it was a great satisfaction to him (Mr. Baird) to find on this occasion that the amount which had been placed to the credit of the investment account was more than double what it was last year. He had great pleasure in congratulating the Chairman and the Directors on the results of their labours in the shareholders' interests; and he could assure them that these labours were thoroughly appreciated.

The CHAIRMAN, in reply, said with regard to the manner of treating the loss on transfer of the Randers works, he thought it was identical with what had been done in respect of Flensburg, only that the detail was not shown on the occasion of the Randers transfer. The shareholders would see in the present accounts that the £40,000 was shown as an express item; while, the Secretary informed him, in the case of Randers it was deducted from the amount at the credit of reserve and depreciation account before the balance of £228,884 was brought in.

Mr. WARREN remarked that this was the first year the detail had been shown as to the way the account was made up.

The motion was unanimously carried.

Lieut.-Col. C. M. DAVIDSON moved the declaration of a final dividend for the year ended June 30 last of 2½ per cent. on the preference shares, 5 per cent. on the ordinary shares, and a bonus of 1 per cent. on the ordinary shares.

Mr. R. S. GARDINER seconded the motion, which was unanimously passed.

PURCHASE AND CANCELLATION OF SHARES.

The CHAIRMAN said that he had next to move a resolution whitewashing the Directors, because of their action in purchasing a certain number of the Company's shares as an investment on account of the payment to the Company of the Randers purchase-money. They had bought 235 shares; and he therefore moved—"(*a*) That the purchase by the Directors of 235 of the Company's shares be approved." Further, "(*b*) That the Directors be authorized to purchase from time to time ordinary and preference shares of the Company to an amount not exceeding £100,000." And as a corollary to that—"(*c*) That the Directors be authorized to reduce the capital of the Company by cancelling the shares purchased for the Company should they deem it desirable to do so." As the shareholders were aware, at the end of the present year the Company were entitled to a large sum of money from Aalborg; and they would want an investment for it. They had spent nearly the whole of the money requisite to finish the new works at Flensburg; and the other work they had in front of them was not more than the Company's ordinary resources would provide for. But the money from Aalborg would have to be dealt with; and rather than keep it at the bankers, or invest it outside, the Directors thought it better they should buy up a certain proportion of the Company's shares, which meant they would make an investment at 6 per cent., instead of an investment at a smaller rate. If it should happen that they lost Flensburg four years hence, it was possible they would then have a much larger sum to deal with; and they could not possibly have a better way of disposing of it than this.

Mr. J. H. BIRCHENOUGH, C.M.G., seconded the resolution in its three parts.

Mr. BAIRD said that the only suggestion he ventured to make in

connection with this matter was as to whether it would not be also desirable to purchase and cancel some of the debentures.

The CHAIRMAN said the Board had in the past year purchased and cancelled £3030 of debentures; and they were within their right in doing that. But, in addition, they had bought ordinary shares to the extent of £2350.

The resolution was unanimously agreed to.

On the proposition of Mr. M. M. BIDDER, seconded by Mr. BERNARD F. HARRIS, Mr. Edwin Waterhouse, F.C.A., and Major E. A. Critchely were re-elected Auditors.

Mr. R. L. ANDREWS, in proposing a vote of thanks to the Chairman and Directors, said, as a very old shareholder, and one who had never attended a meeting of the Company before, but knowing Copenhagen and the gas-works their money was in, he fully appreciated how the Chairman and Directors had had to work in conducting affairs so far off. The dividend had increased from small to medium, and now it was 10 per cent. Not long since he came from Canada, where 10 per cent. was a big amount for gas companies, and where the gas companies were looked after rather severely by the authorities. It was very refreshing to find that all his investments in gas companies had never had their dividends reduced. He had pleasure in proposing a vote of thanks to the Directors, and especially to Mr. Woodall, whom he had known ever since he (Mr. Andrews) was a boy, or at any rate for thirty years. He was pleased to find him in the position of Chairman of this Company.

Mr. M. M. BIDDER seconded the motion, which was cordially passed.

The CHAIRMAN said, on behalf of the Board, he was greatly obliged for the vote of thanks. This was an interesting time in the history of the Company; and he thought they might look forward to a period of continued prosperity.

Gas-Workers' Wages at Bradford.—When the minutes of the Gas Committee were submitted for confirmation by the Bradford City Council, Alderman Trotter inquired if a member of the Committee had conducted meetings of men at the gas-works. In reply, Mr. H. Geldard, the Chairman, said: I believe it is a fact that one of the members of the Gas Committee has held meetings or spoken to the men at the Valley Road and Birkshall Lane gas-works some time during the last two months. The probable result of these meetings has been that we have been requested by the Gas-Workers' Union (Leeds) for an advance of wages to the men amounting to over £4000 a year.

A Gas-Worker's Death.—The Birmingham City Coroner last Wednesday held an inquest on the body of a labourer named Thomas Hutchinson, whose death occurred at the Saltley Gas-Works of the Corporation. It appeared from the evidence of the widow that deceased had complained of an injury said to have been received twelve months ago. Thomas Rogers, foreman, said that on the day of his death deceased was emptying a purifier. Before he had the seizure, he had wheeled away several barrow-loads of oxide of iron. He suddenly complained of tightness about the chest, and told a companion who was working with him that he had difficulty in getting his breath. Deceased did not give any indication of having been "gassed." Dr. Hamilton attributed the death to heart disease; and a verdict of "Death from natural causes" was returned.

CEARA GAS COMPANY, LIMITED.

A Higher Dividend—The Death of Mr. Herbert Gandon.

The Annual General Meeting of this Company was held last Friday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. F. A. WALLROTH in the chair.

The SECRETARY (Mr. George R. Guyatt) read the notice convening the meeting, and the report and accounts were taken as read.

The CHAIRMAN, before moving the adoption of the report and accounts, said that there was one paragraph in the report to which he would like to allude. He felt sure the shareholders would all partake in the sorrow with which the Board received the news of the death of Mr. Herbert Gandon, their late Engineer. He had been in a very bad state of health for some time; and the Directors had a telegram at the end of last July, saying that he had been peremptorily ordered home by the doctor. Unhappily, however, he was too ill to reach England. He knew the sympathy of the proprietors would go out to Mrs. Gandon in her sad bereavement. The satisfactory progress of the Company during the last few years testified to the ability with which Mr. Gandon managed their affairs. Coming to the report and accounts, there were just a few points to which he would call attention. It was a very great pleasure to the Board to meet the shareholders on this occasion, and present the report and accounts which he thought they would all deem satisfactory. The net profit was £1200 more than last year. As regarded the profit and loss account, taking it in some detail, there was an increase in the item of coals carbonized of £700, in manufacturing of £100, in maintenance of £600, in rents and taxes of £160, in bad debts and allowances of £200. General charges were £300 less, and exchange was £800 more. This last was a matter which was totally beyond the control of the Board, and the increase largely resulted this time through there having been more money remitted. Commission, also, was slightly more. On the other side, there was an increase in the receipts from gas supplied of £700, and in products and fittings of £2900. This increase in the returns from products was greatly due to the sale of their coke. The shareholders would remember that last year he had occasion to explain that they had a large stock of coke on hand for which they could not find a market; and as coke always deteriorated rapidly, they thought it advisable not to take any credit for the stock of coke in the accounts on that occasion. He pointed out, however, that if they did find a market, it would come in as profit for the following accounts. They had disposed of the whole of it; at the end of the year there was no stock. This fact accounted to a very great extent for the increase in the item of products. The result, practically, was an increase of 8 per cent. in the expenditure and of 9 per cent. in the receipts—leaving a profit of £8700, which, as he had said, was £1200 more than last year. The Board proposed to deal with this as set out in the report. The exact result of the year's working was a net profit of £8699, which, added to the balance brought forward, gave a total of £12,880. Deducting the interim dividend paid in April last (£1681), there remained £11,199 available for division. Out of this sum, the Directors had transferred £4000 to the reserve fund—making this account £20,000—and recommended the payment of a dividend for the

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 311.

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct 14	5	Alliance & Dublin Ord. .	87 - 89	+1	5 12 4
374,000	Stk.	July 14	4	Do. 4 p.c. Deb.	95–98	..	4 1 8
200,000	5	Oct. 28	7	Bombay, Ltd., . . .	6⅞–6⅞*	+⅛	5 5 8
40,000	5	,,	7	Do. New, £4 paid .	4⅞–5⅛*		5 9 3
50,000	10	Aug. 31	15	Bourne- 10 p.c. . .	28½–29½	..	5 1 8
311,810	10	'	7	mouth Gas B 7 p.c. .	16½–16⅝	..	4 3 7
75,000	10	..	6	and Water Pref. 6 p.c.	14⅜–15¼	..	3 18 8
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	246–249	..	5 0 5
330,000	,,	..	9⅜	Do. New . . .	184–186	..	5 2 2
50,000	,,	,,	5	Do. 5 p.c. Pref. .	—	..	—
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	99–101	..	3 19 3
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	215–218	..	5 0 11
246,320	,,	..	8	Do. A Ord. Stk. .	157–160	..	5 0 0
460,000	20	Sept. 29	10⅝	British	44–45	..	4 12 4
109,000	Stk.	Aug 11	6	Bromley, A 5 p.c. . .	117–119	..	5 0 10
165,700	,,	,,	4½	Do. B 3½ p.c. . .	88–90	..	5 0 0
82,278	,,	'	5⅜	Do. C 5 p.c. . .	107–109	..	5 0 11
55,000	,,	June 29	3½	Do. 3½ p.c. Deb. .	85–87	..	4 0 6
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	97–99	..	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	3–4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref. .	4⅛–5⅛	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	50½–51½	..	5 16 6
100,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	88–90	..	5 0 0
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord. . .	109½–111½	..	4 9 8
1,513,280	Stk.	,,	5⅛	Commercial 4 p.c. Stk. .	105–108	..	4 16 3
560,000	,,	,,	5	Do. 3½ p.c. do. .	101–103	..	4 17 1
475,000	,,	June 29	3	Do. 3 p.c. Deb. Stk.	79–81	..	3 14 1
800 000	Stk.	June 10	5	Continental Union, Ltd.	95–97	−1	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137–139	..	5 0 9
492,270	Stk.	—	5½	Derby Con. Stk. . . .	122–124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk. . . .	104–105	..	3 16 2
148,995	,,	Oct. 14	5	East Hull 5 p.c. Ord. .	103–105	..	4 15 3
486,090	10	July 14	12	European, Ltd. . . .	24–24½	..	4 18 0
354,060	10	,,	12	Do. £7 10s. paid.	17⅞–18½	..	4 18 8
16,179,445	Stk.	Aug. 12	4⅜	Gas 4 p.c. Ord. . .	104⅛–105⅛	−⅛	4 8 5
2,600,000	,,	,,	3½	light 3½ p.c. max. . .	87–89	..	3 18 8
4,002,235	,,	,,	4	and 4 p.c. Con. Pref.	103–105	−1	3 16 2
4,331,705	,,	June 29	3	Coke 3 p.c. Con. Deb.	80–82	..	3 13 2
258,740	Stk.	Sept 15	5	Hastings & St. L. 3½ p.c.	92–94	..	5 6 5
82,500	,,	'	6⅛	Do. do. 5 p.c.	114–116	..	5 12 1
70,000	10	Oct. 14	11	Hongkong & China, Ltd.	17–17⅛	..	6 5 8
131,000	Stk.	Sept. 15	7½	Ilford A and C . . .	145–148	..	4 19 8
65,780	,,	,,	5⅛	Do. B	112–114	..	5 3 1
65,500	,,	June 29	4	Do. 4 p.c. Deb. . . .	98–100	..	4 0 0

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	9†	Imperial Continental .	187–189	..	4 15 3
1,235,000	Stk.	Aug. 12	3⅛	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	120–122	..	4 18 4
561,000	Stk.	,,	10	Liverpool United A. .	220–222	..	4 10 1
718,100	,,	,,	7	Do. B . .	162–164	..	4 5 4
306,083	,,	June 29	4	Do. Deb. Stk.	104–106	..	3 15 6
75,000	5	June 29	6	Malta & Mediterranean.	4⅛–4½	..	6 3 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	99–101	..	4 19 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	99–101	..	4 9 1
541,920	20	May 27	3⅛	Monte Video, Ltd. . .	12⅝–13	..	5 7 8
1,775,892	Stk.	July 28	4⅜	Newc'tle & G'tesh'd Con.	102–103	+½	4 5 0
529,435	Stk.	June 29	3⅛	Do. 3½ p.c. Deb.	90–91	..	3 16 11
55,940	10	Aug. 31	7	North Middlesex 7 p.c.	13½–14½	..	4 16 7
300,000	Stk.	Apl. 29	8	Oriental, Ltd. . . .	138–140	..	5 14 4
60,000	5	Sept. 15	8	Ottoman, Ltd. . . .	6–6¼	..	6 8 0
31,800	53	Aug. 31	13	Portsea Island A. . .	131–133	..	5 3 0
60,000	50	,,	13	Do. B. . . .	124–126	..	5 3 2
100,000	50	,,	12	Do. C. . . .	117–119	..	5 0 10
114,800	50	,,	10	Do. D and E.	102–104	..	4 16 2
398,490	5	Oct. 28	7	Primitiva Ord. . . .	7⅛–7⅜*	..	4 13 4
796,980	5	June 29	5	Do. 5 p.c. Pref. .	5⅛–5⅛	..	4 11 11
488,900	100	June 1	4	Do. 4 p.c. Deb. .	97–99	..	4 0 10
312,650	Stk.	June 29	4	River Plate 4 p.c. Deb. .	97–99	..	4 0 10
250,000	10	Sept. 29	9	San Paulo, Ltd. . . .	15⅛–15⅝	..	5 14 3
62,500	10	,,	6	Do. 6 p.c. Pref. .	11⅛–11⅝	..	5 2 2
125,000	50	July 1	5	Do. 5 p.c. Deb. .	51–52	..	4 16 2
135,000	Stk.	Aug. 31	10	Sheffield A	229–231	..	4 6 7
209,984	,,	,,	10	Do. B	229–231	..	4 6 7
523,500	,,	,,	10	Do. C	229–231	..	4 6 7
70,000	10	Oct. 14	6	South African	10⅞–11⅛	..	5 6 8
6,429,895	Stk.	Aug. 12	5/9/4	South Met., 4 p.c. Ord.	121–123	..	4 8 10
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	80–82	..	3 13 2
209,820	Stk.	Aug. 31	8	South Shields Con. Stk.	155–157	..	5 1 11
605,000	Stk.	Aug. 12	5⅜	S'th Suburb'n Ord. 5 p.c.	120–122	..	4 12 9
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–122	..	4 2 0
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	121–123	..	4 1 4
502,310	Stk.	May 12	5	Southampton Ord. . .	110–112	..	4 9 3
120,000	Stk.	Aug. 12	7	Tottenham A 5 p.c. .	141–143	..	4 17 11
483,940	,,	,,	5⅜	and B 3½ p.c. .	112–114	..	4 16 6
149,470	,,	June 29	4	Edmonton 4 p.c. Deb.	57–59	..	4 0 10
182,380	10	June 10	8	Tuscan, Ltd.	9–9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	98–100	..	5 0 0
236,476	Stk.	Aug. 31	5	Tynemouth, 5 p.c. max.	112–114	..	4 7 9
255,636	Stk.	Aug. 31	6⅜	Wands- B 3½ p.c. . .	139–141	..	4 15 9
85,766	,,	June 29	3	worth 3p.c. Deb. Stk.	73–75	..	4 0 0

Prices marked * are "Ex div." † Next dividend will be at this rate.

six months ended June 30 of 5 per cent. on the preference shares (less income-tax), and of 6 per cent. on the ordinary shares (tax free)—together £2581. These payments, with the interim dividend already paid, would make 10 per cent. on the preference shares and 9 per cent. on the ordinary shares for the year—that was, 1 per cent. more on the latter than was paid last year. The balance carried forward would be £4617. The Company's debentures (£10,300) would be redeemed at the end of this year. The money was in hand, as would be seen by the amount invested. A further sum had been invested this year, so that there were ample funds with which to pay off the debentures. This operation would, of course, greatly deplete the amount invested; but they would, he thought, still have some £3000 left. It would be the aim of the Directors in future years to increase the amount invested as much as they could, so as to be prepared against any eventuality such as they experienced some years ago, when there was a drought, and they were very hard up for money, owing to the Province being unable to collect the wherewithal to pay the Company. He concluded by moving the adoption of the report and accounts.

Mr. F. W. BROTHERS seconded the motion.

Mr. CHARLES WEBB said he noticed an item in the accounts "Dividends unpaid, £370." He took it these were unclaimed dividends; and, if so, was it not possible to find claimants? He thought some steps ought to be taken to ascertain whether these persons had lost sight of their shares.

The CHAIRMAN, in reply, said they were mostly people on the other side; and the Company could not take steps to find them. The dividends were posted half yearly. As a rule they were not returned, but were outstanding, and were liable to be presented at any time.

The resolution was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. THOMAS M'MAKING, a dividend was declared for the six months of 5 per cent. on the preference shares (less income-tax) and of 6 per cent. on the ordinary shares (tax free), making with the interim dividend already paid 10 per cent. on the preference shares and 9 per cent. on the ordinary shares for the year.

The retiring Directors (Mr. Brothers and Mr. M'Making) were then re-elected, on the motion of the CHAIRMAN, seconded by Mr. F. E. LINGING, as was also the Auditor (Mr. A. W. Cooper), on the proposition of Mr. T. A. GUYATT, seconded by Mr. WEBB.

Mr. WEBB, in proposing a hearty vote of thanks to the Chairman and Directors, remarked that the Company was a progressive one.

Mr. LONG seconded the resolution, which was cordially agreed to.

The CHAIRMAN, after acknowledging the compliment, proposed a similar vote to the Engineer and staff in Ceara and the Secretary in London. He remarked that they had filled Mr. Gandon's place by appointing Mr. John Reid, who was an old servant with the Company. The Directors had every confidence in Mr. Reid's integrity, and in his ability to carry on the Company's work in a satisfactory manner.

Mr. M'MAKING seconded the proposal, which was heartily carried.

The SECRETARY'S acknowledgment brought the meeting to a close.

HOLBORN PUBLIC LIGHTING.

Proposed Competitive Trial of Gas and Electricity.

At the Meeting of the Holborn Borough Council last Wednesday, the Works and General Purposes Committee further reported on the public lighting of the borough, having special reference to the petition of a number of the inhabitants in favour of improved lighting in the thoroughfares of Holborn, High Holborn, and New Oxford Street, to which reference was made in the "JOURNAL" for the 18th ult. (p. 208).

The Committee stated that in the course of the debate which took place on the report they presented to the Council on the 27th of July with reference to their proposals for the improvement of the lighting of the borough, which were not adopted, a letter was read from the Secretary of the Metropolitan Electric Supply Company, asking for an opportunity of submitting a scheme of lighting by electricity; and the Committee had had the subject before them. In order that the Council might have an opportunity of deciding as to the most suitable system of improved lighting to be adopted, the Committee were of opinion that the Electric Lighting Companies and the Gaslight and Coke Company should be invited to give a public demonstration, extending over a considerable period, in one of the streets of the borough. They had accordingly given directions that the Gas Company, the Metropolitan Electric Supply Company, and the County of London Electric Supply Company should be invited to undertake such a trial at their own expense, subject to the terms of a specification to be prepared by the Borough Surveyor and approved by the Committee—the specification to provide for equal illuminating power by either system, so that a correct estimate might be formed of the respective merits of each kind of lighting. To make the test thoroughly satisfactory, it was necessary to conduct the experiments in some thoroughfare where the lighting was entirely dependent upon the public lamps; and the Committee thought that for this purpose Gower Street was most suitable. They proposed that an equal section of the street should be given over for lighting by each Company. During the trial, frequent tests would be made of the illuminating power of each light; and at the conclusion of the trial period the Committee would submit a report of the results, both from the point of view of efficiency of the light and its cost. The Committee reported that they had also considered the memorial presented to the Council by inhabitants of the borough at the last meeting, with reference to this subject. They said the memorialists appeared to be unaware that the proposal to give the Gaslight and Coke Company a ten-years contract had already been rejected by the Council, and that the question of improving the street lighting was still under consideration. They recommended that the action of the Committee in inviting the Electric Lighting Companies and the Gaslight and Coke Company to carry out a series of experiments in street lighting in Gower Street be approved; and that a reply be sent to the memorial of inhabitants on the

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subject of the lighting of the borough, informing them that the proposals of the Gaslight and Coke Company for lighting the borough for a period of ten years were declined in July last, and that the question of the best method of improving the lighting of the borough is still under consideration.

Mr. NOLAN GLAVE, the Chairman of the Committee, stated that they had chosen Gower Street for the purposes of the experiment because there was no shop lighting or other extraneous lighting in it. He should like those who formed the deputation to the Council to understand that there was no question of a ten-years agreement between them and the Gas Company, as provision was made for the Council to terminate the contract at the end of five years by the payment of a sum of £2500 to the Company—proving that the Council had not overstepped the limits of public business. At the end of the contract term, whether long or short, the Council would be in possession of the lanterns and burners supplied by the Gas Company; while if the Electric Light Company lighted the streets, the Company would have to provide new standards throughout the district, which would be a capital charge upon the new lighting to be paid by the Council. In answer to a question, Mr. Glave explained that it was proposed to divide the street selected into three sections, and give one to each of the three Companies, and the lamps would be alight simultaneously.

FINANCES OF BRADFORD.

The Trading Departments.

The Bradford City Treasurer (Mr. G. A. Thorpe), in his abstract of the accounts of the Corporation for the year to March 31 last, shows that the total receipts for the twelve months amounted to £2,410,396, and the payments to £2,658,137; and there was at the end of the year a balance in the hands of the bankers of £131,965. On works there had been expended up to the end of the year £12,417,927, of which £11,931,923 had been spent on capital account. Deducting the amount paid off by means of sinking funds, the net debt of the city at that date was £8,068,023. On March 31, there was an aggregate amount of £111,616 standing to the credit of depreciation and reserve accounts, of which £44,006 was in respect of the tramways, £7952 in respect of the electricity department, and £26,702 in respect of the gas undertaking. The sum raised by rates during the year was £516,584; and £29,000 was transferred from the trading departments to the rate-aided funds, of which sum the tramways contributed £20,000, the gas department £6000, and the conditioning-house £3000.

The capital expenditure on the gas-works amounts to £1,265,632, of which £406,300 has been provided for by sinking fund; and the amount outstanding is £759,332. The revenue for the year was £286,954; and the gross profit, £58,406. After deducting interest and sinking fund, there remained a deficit of £737. At the beginning of the year, the department had a surplus of £6485; but £6000 was appropriated to the relief of rates, and there is consequently a deficit of £253 to be carried forward. The total standing to the credit of the department's reserve accounts is £26,702.

On a capital expenditure of £775,667, the electricity department owed at the end of the year £516,703. The income for the year was £113,983, and the gross profit £63,135, which is reduced after payment of interest and sinking fund to £7399. Of this amount, £5000 was transferred to renewals account, which on March 31 stood at £7952. There was then an unappropriated revenue balance of £5364.

The capital expenditure on the water-works up to the end of the year is shown to be £3,734,907, towards which there has been provided by means of sinking fund £744,634; leaving an indebtedness of £2,990,273. The income for the year was £186,597, and the working expenses £42,213, which gives a gross profit of £144,384. From this, £128,762 has to be deducted for interest and sinking fund charges, leaving a net profit of £15,622. Of the latter sum, £2177 was utilized to wipe out a deficit balance, and the remainder was carried forward. The income of the Nidd Valley Light Railway was £4331, and the deficit £334, as compared with £2233 for the previous year.

GAS-METER RENT CHARGES AT SALFORD.

Town Council Decide on Abolition.

There was a good deal of discussion at the meeting of the Salford Town Council last Wednesday on the recommendation of the Gas Committee, already noticed in the "JOURNAL," that, in view of the strong feeling prevalent in the borough, the charges for gas-meter rents should be abolished. The only point of difference really was as to when the resolution should become operative. The original intention of the Committee was to withdraw the charges from Dec. 25 next; but several members were in favour of the resolution being made retrospective. It was pointed out by the Town Clerk, however, that since the rents which had been paid in the past quarter's accounts had been legally collected, none of the money could be returned. In the end, it was agreed for the abolition of the charges to date from Sept. 29, which means that they will not be included in the current quarter's accounts.

The position of the Gas Committee in the matter was explained by the Chairman (Alderman Phillips), who moved the adoption of the resolution for the abolition of the rents. He explained that when the estimates of the different Committees were before the Council, the Gas Committee had pressure brought to bear upon them to increase their contribution in relief of rates; and in order that this could be done, the Council on the 22nd of June last adopted a resolution authorizing the Committee to re-impose the meter-rents, lower the quantity of gas supplied to users of penny-in-the-slot meters from 30 to 27 cubic feet for 1d., and reduce the price to consumers of very large quantities of gas.

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entirely new finish, which is now perfected, and is

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Alderman Phillips added that if it were the will of the Council to take from the Gas Committee the responsibility of handing over anything in relief of the rates, nobody would be more pleased than the Committee, who would then be in a position to supply gas at a low figure to ordinary consumers, and allow a much greater quantity for 1d. to those using prepayment meters. It was for the Council to decide whether, the present way of raising money being objectionable, the Gas Committee should be authorized to adopt some other method, probably that of increasing the price of gas. He pointed out that 88 per cent. of the gas undertakings in the country were charging meter-rents.

After the Gas Committee's resolution had been carried, with but a few dissentients, Alderman Desquesnes moved that the Committee be instructed to raise any further revenue required by "a readjustment of the charges for gas in the usual way." Alderman Huddart, who seconded the motion, expressed the hope that the position of the users of slot-meters would not escape the attention of the Committee when action was taken to give effect to the resolution.

There was no opposition, and the motion was agreed to unanimously.

ST. DAVIDS WATER AND GAS COMPANY'S POSITION.

Appointment of New Directors.

In response to an invitation by Mr. Matthew J. Jarvis, a Solicitor, acting for nearly all the debenture-holders and several of the shareholders in the St. Davids Water and Gas Company, a meeting was held at Salisbury House, E.C., last Tuesday—the Rev. E. Rivers presiding—for the purpose of calling upon the present Directors to resign and to appoint others in their places.

We learn from a long report in the "Financial News" that after Mr. Jarvis had explained the circumstances under which he was acting, he stated that the Directors of the Company were Mr. W. B. Martin, who had been a Director of most of Mr. Preston's companies, Mr. Miller, and Mr. Brown, a clerk employed by Mr. Preston. In almost every instance, the Engineer appointed was Mr. Alex. Painter. He had written to both Mr. Miller and Mr. Martin, inviting them to meet shareholders; but both had replied saying they had other engagements. He was pleased to say, however, that Mr. Saphin, who was Secretary to the Company, was present, and would be able to explain why dividends had not been paid. He had learnt that Mr. Martin intended to hand in his resignation; and he understood that Mr. Miller would do likewise.

Mr. Saphin said that balance-sheets and reports had been sent out regularly to shareholders, and, with the exception of one year, meetings had been held annually. The whole scheme had from the beginning been a great disappointment to the Directors as well as to the shareholders. It was originally thought that St. Davids would be made the port for the Great Western Railway traffic; but the Great Western Bill was eventually altered so as to include Fishguard. The promoters had secured their Act in the belief that the Great Western Railway Company would spend £2,000,000 on St. Davids; but this hope had been shattered. The district, moreover, had not developed to the extent anticipated; hence the Directors could not be held to blame. They had put their money into the concern, and it was lost. They were most anxious to do their best for the Company.

After some conversation, Mr. Miller said that when the Company's Act was secured, it was regarded as quite a foregone conclusion that a light railway would be constructed between Fishguard and St. Davids. The Great Western Company, however, backed out of the project at the last moment. So far as he himself was concerned, he paid for his own qualification as a Director, and he would not back out at the last moment. He did not propose to tender his resignation. He was confident that the Company would prove valuable; and he was prepared to remain on the Board with others. The revenue was only about £200.

Mr. Jarvis: And that is what we paid £21,000 for.

After further discussion, it was resolved that Messrs. Evans, Bone, Fitchett, and Cadman be appointed Directors of the Company. It was also decided to hold a special meeting the following Monday (yesterday).

EXTENSIONS AT THE CLEATOR MOOR GAS-WORKS.

During the past eighteen months, extensions and additions have been in progress at the gas-works of the Cleator Moor Urban District Council; and they were lately inspected by members and officials, who were accompanied by members of the Egremont and Frizington Councils. Mr. J. A. Gray, the Gas Engineer of the Teignmouth Urban District Council, who has been the Consulting Engineer in connection with the extensions, explained the various features of the works.

The scheme of alterations and extensions, which has cost approximately £5000, includes the erection of a two-lift gasholder, having a capacity of about 118,000 cubic feet, which is more than equal to a maximum day's supply of gas. It is of the Gadd and Mason spiral-guided type, and was erected by Messrs. Robert Dempster and Sons, Limited, of Elland. A complete set of four luteless and connectionless purifiers, 12 feet square, has been installed by Messrs. Dempster in a new purifying-house; the purifiers being operated by a centre-valve of the firm's patent Weck type—the purifying material being oxide of iron. The exhausting plant has been duplicated by the provision and erection in the old purifying-house of a 7500 cubic feet per hour exhauster by the Bryan Donkin Company, Limited, Chesterfield. It is driven by a gas-engine; and the whole of the plant is so arranged in connection with the existing steam-driven exhauster plant as to enable either exhauster or both to be driven by the gas or the steam engine

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and now Finished in—

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at will. The old station meter has been replaced by a 6000 cubic feet per hour meter by Messrs. R. Laidlaw and Son, of Glasgow, and a new circulating main, nearly 3000 yards in length, has been laid by Messrs. Dempster; the pressure being controlled by a new 8-inch governor by Messrs. Parkinson and W. & B. Cowan. The whole of the work was satisfactorily carried out by the various firms engaged, under the superintendence of Mr. Gray.

CLAIM AGAINST THE DERWENT VALLEY WATER BOARD.

Arbitration Proceedings.

Readers of the "JOURNAL" are aware that the Derwent Valley Water Board are carrying out a scheme for the supply of Derby, Sheffield, and other places from a source in the Peak district. The aqueduct runs through Darley Dale; and in connection with this portion of the work, the Stancliffe Estate Company made a claim of £8216 upon the Board in respect of land taken and injurious affectation of their Hall Dale quarry. As the Board disputed the claim, the matter was referred to arbitration under the Land Clauses Act; and it recently occupied the attention of Messrs. JOHN COLEMAN and EDWARD HOLMES as Arbitrators and Mr. W. H. ELWELL as Umpire, sitting at the Surveyors' Institution, Westminster, for three days, with the result that a settlement was somewhat abruptly arrived at.

Mr. BALFOUR BROWNE, K.C., and Mr. LOWENTHAL appeared for the claimants; Mr. HONORATUS LLOYD, K.C., and Mr. GIBBONS represented the Water Board.

Mr. BALFOUR BROWNE, in opening the case, said the Stancliffe Estate Company was formed in 1897 for the purpose of purchasing and developing the Stancliffe Hall Estate of the late Sir Joseph Whitworth, which was rather more than 915 acres in extent, situated in Darley Dale. The object of the Company was also to work the Stancliffe and Hall Dale quarries on the estate. When the Company took over the property, they proceeded to work both quarries, and spent £10,258 in connecting them with the Midland Railway. The stone from them was known all over the world. Unfortunately, the Water Board had given the Company notice to acquire by compulsion an "island" of land in the centre of the Hall Dale quarry, which, though infinitesimal in itself, would cause the greatest inconvenience and loss by preventing the Company working a large quantity of stone; while the easement they would require for their aqueduct also had an injurious effect upon the building site adjoining it. For this, the Company now made a claim amounting altogether to £8216. [Counsel gave the several items constituting the total.]

Mr. *J. H. Dawson*, the Managing-Director of the Company, bore out the learned Counsel's opening statement. He said the Company were asking £8216 from the Board; but seeing that they purchased the estate and quarries for development and purely commercial purposes, and that they could not tell what would be the ultimate result of the Board's action, had the sum claimed been offered to them, they would have refused it if they had had the power. In dealing with the quarry, witness said the claimants were entitled to 1d. per foot as royalty as owners of the estate, and as owners of the quarry to a reasonable profit for working it, which he put at 3d. per foot. In excavating for the aqueduct, the Board had used a great deal of stone that would otherwise have been worked; and for this they claimed 4d. per foot, or a total of £1087.

In cross-examination by Mr. HONORATUS LLOYD, witness said the price the Company paid for the estate worked out at £80 per acre, which included the quarries and also the mansion of Sir Joseph Whitworth. He admitted that one-eighth of the stone quarried was good building stone and seven-eighths waste; but he said this did not prevent the quarry being worked at a profit. The tunnel for the aqueduct was, at its deepest point, 154 feet below the surface. He acknowledged that a tunnel at this depth would not have any injurious effect on the land itself; but he said its presence causing persons to refuse to become purchasers would injuriously affect him as a seller. Witness was cross-examined at great length with a view to showing that the Hall Dale quarry was an unprofitable undertaking; but he denied this.

Other witnesses gave evidence to the effect that the working of the quarry would be injuriously affected by the owners being compelled to leave the "island" in the centre of their works; and they agreed that the working cost would be increased by 4d. per cubic yard. The loss of tipping space would, they said, similarly affect the workings.

Evidence having been given as to the nature and use of the stone quarried,

Mr. *T. T. Wainwright*, a Past-President of the Surveyors' Institution, stated that the easements would injuriously affect the land in question for building purposes, apart from the effect they would have on the quarry. Cross-examined at some length as to the possibilities of the tunnel having any effect on the surface of the land, he maintained that persons might in consequence refuse to purchase.

The case for the Water Board was opened by calling evidence to show that the Hall Dale quarry was not a good one, and that the action of the Board would not increase the cost of working it. One witness stated that, in his opinion, from an examination of the Company's books, the quarry was not worked at a profit.

At this stage, a consultation took place between the leading Counsel on either side. As a result,

Mr. BALFOUR BROWNE stated that the parties had agreed to terms. He asked the Umpire to make an award for £3750; remarking that, under section 32 of the Lands Clauses Act, this would carry costs.

A great deal of interest was manifested in the case, as it is understood that there are other large claims against the Water Board, including one of considerable amount in connection with the estates of the Duke of Devonshire.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In the Aberdeen Town Council yesterday, the Gas Committee reported that they had had under consideration section 53 of the Aberdeen Extension and Improvement Act, 1883, which provides for the regulation of the traffic on the railway from Waterloo Quay to the gas-works. It appeared to the Committee to be desirable that the regulations should be amended so as to afford further facilities for the increasing traffic in connection with the gas-works. The Committee accordingly recommended that amendments for this purpose be inserted in a proposed Provisional Order. The Council agreed to the recommendation, and appointed a Sub-Committee to confer with the Harbour Commissioners on the subject.

Mr. Adam Macpherson, who was Manager and is now Chairman of the Kirkcaldy Gas Company, Limited, in addition to having a gas transfer on hand at home, has been called in to a forthcoming transfer at Fraserburgh, having been appointed Arbiter on behalf of the Fraserburgh Gas Company, Limited.

During the past week or two, negotiations have been in progress between the Corporation of Glasgow and adjacent burgh and county authorities with regard to a contemplated extension of the boundaries of the city of Glasgow, and the consequent amalgamation of suburban burghs with the city. Speaking the other evening at a meeting of electors, Treasurer Graham said there would have been no question of amalgamation had it not been for outside people threatening that they desired to go in for a Gas Board and a Water Board. These people did not want to take any of the responsibilities of these undertakings, but to take them as they stood at present, with the capital very largely paid off—by one-half at least—and simply assist Glasgow in their management. Glasgow would not agree to such a policy. The only way to meet the matter was by going forward for a large extension of the city area to those districts which Glasgow supplied with gas and water, and to be able to say that they formed one community. Certain representatives of Govan had spoken very strongly about the Gas Consolidation Bill, as if Glasgow had endeavoured to obtain something that was not in the Bill. As a matter of fact, the question of consolidating various Acts had been before the Corporation for a long series of years. Two years ago it was the Tramways Acts, and in the last session of Parliament it was the Gas Acts which were consolidated. The Glasgow Corporation were very desirous of having differential rates for large consumers of gas, because it was thought that the Corporation would thus be able to supply some of the large consumers who at present could make their own gas cheaper. Such an arrangement would permit the Corporation to use their plant in the summer time, when it was practically idle, and enable them to reduce the price of gas to all consumers. To say that the Glasgow Corporation endeavoured to take advantage of Govan was entirely wrong. One of the Govan critics referred to the indebtedness of Glasgow—saying it was £17 per head of the population; whereas in Govan it was only £4 per head. The fact was that from £12,500,000 to £13,000,000 of the city's indebtedness was incurred by the great commercial undertakings—gas, water, tramways, and electricity departments—which were earning good revenues, and which were well managed. Apart from the sum mentioned above, the indebtedness of Glasgow was £4 10s. or £4 15s. per head of the population. At a meeting of the Corporation on Thursday, a Special Sub-Committee on Amalgamation recommended suspension of the Standing Orders so that a resolution to proceed with a Provisional Order for the extension of the city boundaries might be moved. The areas proposed to be taken in extend to 22,000 acres, contain a population of 275,000, and have a valuation of £1,684,000. There was a discussion upon the subject, held in private, for two hours; and then a division was taken which brought out 43 in favour and 29 against. As there was not a two-thirds majority, the proceedings were brought to a stop meantime. It is understood that there was unanimity as to the necessity for amalgamation, but that it was considered desirable that there should be more friendly negotiations with the other bodies before the question is moved further in. These negotiations it is proposed to resume after a few months have passed.

Bailie Anderson, the Convener of the Gas Committee of the Hamilton Town Council, addressing the electors the other evening, said they had one of the finest-equipped works in Scotland, and, with two exceptions in England, the cheapest gas in Britain. They were specially fortunate in their officials at the gas-works.

On Monday, in the Dean of Guild Court in Dumbarton, authority was granted to proceed with the erection of a coal-store and retort-bench at the Corporation gas-works, the Contractors for which are West's Gas Improvement Company, Limited, of Manchester.

In the course of the present municipal election, Provost Skinner, of Inverurie, stated at a public meeting that a motion would be considered at the next meeting of the Town Council as to the acquisition of the gas-works. He was in sympathy with the movement; but the matter would have to be very carefully considered. If he found that it was to be for the benefit of the ratepayers, he would support the proposal. Mr. A. F. Young, one of the municipal candidates, strongly supported the proposal, thinking that it would mean a supply of cheaper gas for the ratepayers.

The Hospital Sub-Committee of the Aberdeen District Committee of the Aberdeen County Council reported on Monday that they had again had under consideration the question of whether Summerfield Hospital should be lighted by electricity or gas; and they recommended that the lighting be by gas. The estimated cost of introducing the light was £127, and the annual charge from £12 to £15. Gas is to be supplied by the Corporation of Aberdeen at the same price as in the city—2s. 6d. per 1000 cubic feet. The recommendation was adopted.

The Directors of Meters Limited have declared interim dividends to the 30th of September last at the rates of 5½ and 4 per cent. per annum on the preference and ordinary shares respectively.

The New Patent "GARAJO" Boiler

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255.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 29.

Sulphate of Ammonia.

The market opened with a strong tone, and full prices continued to be paid in the early part of the week; but the month's requirements having been filled, the position has become somewhat easier, and the closing values are barely steady at £13 per ton f.o.b. Hull, £13 1s. 3d. per ton f.o.b. Liverpool, and £13 3s. 9d. per ton f.o.b. Leith, for early shipment. In the forward position, no new first-hand business has transpired; but it is reported that sales have been made by dealers for delivery over the first half of next year at a discount on current values, though for this period makers are still quoting the prices now ruling.

Nitrate of Soda.

There is a better feeling in this article, but so far quotations remain without alteration at 9s. 4½d. per cwt. for 95 per cent. quality, and 9s. 7½d. for refined, on spot.

LONDON, *Oct.* 31.

Tar Products.

The markets for tar products have been fairly steady throughout the past week. Creosote has not improved, and new orders are scarce. Benzols are steady for prompt; but improved prices cannot be obtained for forward. Crude carbolic still remains in a somewhat unsatisfactory state. Solvent naphtha is in fairly good position, and a little business has transpired at present market prices. Heavy naphthas are steady, and a fair amount of business has been transacted of late. In pitch, the market has been quiet, and new orders are scarce.

The average values during the week were: Tar, 17s. 3d. to 20s. 9d. *ex* works. Pitch, London, 34s. to 34s. 6d.; east coast, 33s. 6d. to 34s.; west coast, 37s. to 38s. 6d. Clyde ports, 32s. 6d. to 33s. Manchester, 33s. 6d. to 34s. Liverpool. Benzol, 90 per cent., casks included, London, 7¾d. to 8d.; North, 7½d. to 7¾d.; 50-90 per cent., casks included, London, 7⅞d. to 8d.; North, 7½d. to 7⅞d. Toluol, casks included, London, 9d. to 9½d.; North, 9d. Crude naphtha, in bulk, London, 3⅜d. to 4d.; North, 3½d. to 3¾d.; solvent naphtha, casks included, London, 11½d. to 1s. 0½d.; North, 11d. to 1s.; heavy naphtha, casks included, London, 11⅜d. to 1s.; North, 10½d. to 11d. Creosote, in bulk, London, 2⅜d. to 2½d.; North, 1⅞d. to 2⅛d. Heavy oils, in bulk, 2⅜d. to 2¾d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0½d.; west coast, 1s. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market for this article has remained very firm, and prices continue to improve. Actual Beckton is quoted £12 2s. 6d.; outside London makes, £12 10s.; Hull, £13 1s. 3d. to £13 2s. 6d.; Leith, £13 5s.; Liverpool, £13 2s. 6d.; and Middlesbrough, £13 2s. 6d.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade is still irregular; and the lack of steamers at some of the ports causes the shipments to be restricted in some instances. In steam coals, there is variation in the quotations; best Northumbrians being from 9s. 3d. to 10s. per ton f.o.b., according to the position of the colliery. Second-class steams are from 8s. 6d. to 8s. 9d.; and steam smalls are from 5s. 3d. to 6s. 6d. Work is fair at the collieries, and seems likely to continue so, if shipments are normal. In the gas coal trade, the demand now shows a steady increase; but steamers have been scarce, and higher freights have been needed to ensure tonnage to take the enlarged quantities required on the long contracts. Durham gas coals vary in price. The usual classes are from 8s. 6d. to 9s. 9d. per ton f.o.b., according to quality; and for "Wear" specials, about 10s. 3d. per ton is the f.o.b. price. There are few contracts in the market at present. Some sales, however, are being negotiated for Italian ports at 16s. per ton delivered at Genoa. Coke is firmer; and for good gas coke 13s. 6d. to 14s. per ton f.o.b. is now quoted.

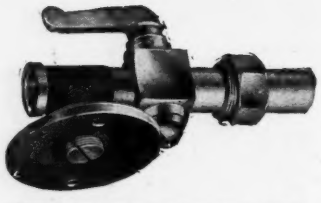
Scotch Coal Trade.

The market has been fairly active; the home demand continuing the least satisfactory. It may be said that the coal trade is waiting for the settlement of the trouble in the shipbuilding industry. The prices now quoted are: Ell, 8s. 9d. to 10s. per ton f.o.b. Glasgow; splint, 9s. 3d. to 9s. 6d.; and steam, 8s. 9d. to 9s. The shipments for the week amounted to 335,424 tons—an increase of 6087 tons upon the preceding week, but a decrease of 11,322 tons upon the corresponding week last year. For the year to date, the total shipments have been 13,123,095 tons—an increase upon the corresponding period of 698,073 tons.

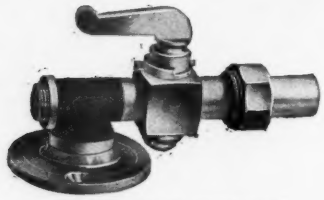
An Elective Auditor on the St. Helens Gas Undertaking.—The following is an extract from the account in the "St. Helens Reporter" of the Elective Auditor's report on the working of the gas undertaking in the last financial year: "I have again to point out that the gas account shows a substantial balance on the year's working, and is again able to help the borough fund by a solid amount to relieve the rates, and thus relieve the general burden of rates to the ratepayers year by year. We now look forward to this department to furnish the means whereby the rates are kept down. The balance profit on the year's working from April 1, 1909, to March 31, 1910, is £9298 19s. 11d., which it has been decided to apportion as follows: To capital account, extension of mains and services, £1896 19s. 1d.; to works improvement account, £2402 0s. 10d.; to borough fund account (to relieve the rates), £5000—total, £9298 19s. 11d.. The ratepayers of St. Helens have every occasion to be proud of their gas undertaking; and the credit for the success of this undertaking is largely due to the efficiency of the Gas Engineer, Mr. S. Glover, whose genius and inventive ability have made St. Helens famous for its up-to-date means of producing gas all over the world."

Something New!

TWO-WAY GAS FIRE TAP.



USED AS STRAIGHT-WAY TAP.



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Aldridge Gas Company to be Wound-Up.—At an extraordinary general meeting of the shareholders of the Aldridge Gas Company, Limited, held recently at Walsall, a resolution was passed to the effect that the Company should be wound-up voluntarily. Mr. W. J. Cooke, of 145, Lichfield Street, Walsall, the Secretary of the Company, was appointed Liquidator.

New Joint-Stock Companies.—Hotton Malleable Fittings Company, Limited, has been registered with a capital of £300, in £1 shares, to carry on the business of dealers in malleable and other gas-fittings, meters, pipes, and apparatus, &c. Under the title of Ernst Hildebrandt, Limited, a Company has been registered with a capital of £5000, in £1 shares, to carry on the business of manufacturers of ceramic articles and accessories used in the incandescent gas light industries; also to acquire the undertaking in England of the Vereinigts Magnesia Company and Ernst Hildebrandt Aktiengesellschaft of Pankow-Berlin.

Unprofitable Electricity Supply by the Stalybridge Joint Board.—In the course of the proceedings at a recent meeting of the Ashton Town Council, reference was made to a reported offer from the Stalybridge, Hyde, Mossley, and Dukinfield Joint Electricity Board to supply the Ashton Corporation with current at a lower price than that at which it could be produced at Ashton. Alderman M. L. Hall said that no such offer had been received; but he did not agree that the Joint Board could produce current at a cheaper rate than Ashton. During the last five years, the Ashton undertaking had made a considerable profit; whereas the Board for the same period showed a loss of £13,019. These figures spoke for themselves; and no further comment was required.

Sale of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold three new issues of capital by order of Directors. The first lots consisted of £4000 of additional ordinary consolidated "A" stock of the Bognor Gas Company, ranking for a standard dividend of 5 per cent. per annum, but carrying 5¾ per cent. from the 7th inst.; and it was all sold at from £110 to £112 per £100. Next came an issue of £2000 of 4½ per cent. perpetual debenture stock of the Company, which fetched from £100 to £101 per £100. A new issue of £10 "B" 7 per cent. shares in the Grays and Tilbury Gas Company, carrying £5 12s. per cent. per annum as from the 11th inst., was placed at £10 10s. to £10 12s. 6d. per share. The last lots offered were some £10 "B" 8 per cent. shares in the Tendring Hundred Water Company, carrying dividends at the rate of 4½ per cent. per annum; and they realized from £10 12s. 6d. to £11 each.

We understand that the makers of one of the exhausters erected at the new Padiham Gas-Works recently opened—as reported in the last two issues of the "JOURNAL"—were Messrs. George Waller and Son, of the Phœnix Iron-Works, Stroud, Glos.

Last Tuesday, a disastrous fire occurred at the premises of the Bland Light Syndicate, Limited, in Fennel Street, Manchester. Such was the extent of the conflagration, that the place was completely gutted. Notwithstanding this, however, owing to the large stock the Syndicate have in hand for the season's requirements, all orders are being executed expeditiously direct from the works.

A report has been presented to the Eccles Town Council as to the experimental supply of electricity for lighting a block of houses belonging to the Corporation. It was stated that the supply was unlimited; there was one meter for the whole block; and the charge was 6d. per week per house added to the rent. Alderman Pearson said the cost had worked out at about 4d. per week per house; and the Committee were prepared to treat with any owner of property who would light a block of about twelve houses and pay on the basis of the rent.

An agreement has been arrived at in the dispute between the Paignton District Council and their former Water Engineer, Mr. Vanstone. The point at issue was as to the remuneration to be allowed for Mr. Vanstone's services in connection with the arbitration proceedings under the contract for the water-works. It has now been arranged that he shall be paid £225 in full and final settlement, and that he shall receive such documents in the Council's possession as are his private property, and hand over any plans and papers belonging to the Council which he may have.

According to a paragraph in the "Daily Mail" last Friday, Mr. Henry Claridge, an engineer, was attacked by a number of young men, and received a severe scalp wound, as he was leaving the premises of the Gaslight and Coke Company at Bow Common last Wednesday night. It is reported that the members of this gang have lately terrorized the neighbourhood. They were pursued by the police and a crowd of people; but the men kept their passage clear by firing their revolvers at random. A young man was shot in the shoulder, and had to be taken to the Poplar Hospital. No arrests were effected.

We have received from Messrs. J. & W. B. Smith, of Farringdon Road, E.C., the new shop lighting list they have just issued, accompanied by a sheet of artistic and up-to-date fittings for domestic lighting. The list shows the firm's "Silva," "Graetzin," and "Imperial" lamps. The first-named lamp, which they put forward as an ideal one for both inside and outside shop lighting, is shown dissected, so that the simplicity of its construction, and the ease with which any part can be replaced, are apparent. The lamp is also made with a parabolic reflector of new shape. The "Graetzin" high-power outdoor lamps working at low pressure are suitable for lighting all large areas; and the "Imperial" is a regenerative indoor lamp. For all these lamps a lighting efficiency of about 31 candles per cubic foot is claimed. The rest of the list is occupied with illustrations of suitable fittings for inside shop lighting, "Glasmi" mantles, and patterns of inverted gas-burners, all British made. On the last page are shown samples of advertising screens for gas-lamps. We learn that this neat and concise list is being sent to all the gas companies in the United Kingdom, accompanied by an offer by the firm to send a supply, free of charge, with the Company's name and address printed thereon, and the amount of discount they are prepared to allow on the prices stated. They consider the distribution of these booklets among a gas company's customers should lead to increased business.

The "AGATE."

PARKINSON FIRES
are unsurpassed for
Heating Efficiency and Economy in Gas Consumption.
All Wearing Parts Strictly Interchangeable.
HIRED OUT BY MANY GAS UNDERTAKINGS.

The "BASIL."

May we send you a Sample for inspection?
THE PARKINSON STOVE CO., LD.
(Incorporating MAUGHANS' PATENT GEYSER CO.)
BIRMINGHAM & LONDON.

The "CRYSTAL."

Messrs. Fletcher, Russell, & Co., Limited, ask us to state that the competition advertised on p. II. of our issue of Oct. 18, under the title of "The Luxury of the Geyser," will close on Nov. 30—that is to say, all designs must reach the Palatine Works, Warrington, not later than the evening of that day.

The Manchester Smoke Abatement Society have decided to promote an exhibition of ways and means of preventing or reducing smoke. The date of the exhibition has been fixed as from Oct. 16 to Nov. 4 next year. A deputation from the Bradford Electricity Committee, who recently paid a visit to the Glasgow Smoke Abatement Exhibition, have come back impressed with the importance of holding such an exhibition in Bradford; and this forms one of their recommendations to the Council. In one detail the exhibition was considered incomplete—no special grates or other inventions for the prevention of smoke in steam-boilers being shown. The chief object aimed at, they say, appears to have been to encourage the extensive use of gas and electricity for domestic purposes (as well as power), and so greatly to reduce the number of house-fires. The deputation formed the opinion that the Glasgow exhibition was a complete success from this point of view, and that a similar exhibition in Bradford would not only be of advantage to the electricity and gas departments, but would tend to the promotion of good health and sanitation in the city.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Pontypridd and Rhondda Joint Water Board. Applications by Nov. 14.
CHEMIST AND WORKS MANAGER (FACTORY). Applications to E. White, c/o Hopkins and Williams, Hatton Garden, E.C.
DRAUGHTSMAN. No. 5307.
ANALYST (JUNIOR). No. 5308.

Situation Wanted.

GENERAL MANAGER (GAS FITTING, &c., TRADE). T. L. Cuttell, Stockton-on-Tees.

Plant, &c. (Second-Hand), Wanted.

JET PHOTOMETER. No. 5309.

Patent Licence, &c.

ACETYLENE GAS GENERATORS. Haseltine, Lake, and Co., Southampton Buildings, Chancery Lane, W.C.

Stocks and Shares.

CITY OF ELY GAS COMPANY (BY AUCTION). Nov. 8.
GAS METER COMPANY (BY AUCTION). Nov. 8.
LOWESTOFT WATER AND GAS COMPANY (BY AUCTION). Nov. 8.
PINNER GAS COMPANY (BY AUCTION). Nov. 22.
TAUNTON GASLIGHT COMPANY (BY AUCTION). Nov. 7.

Meeting.

ORIENTAL GAS COMPANY. London Office. Nov. 16 Twelve o'clock.

TENDERS FOR

Fire-Clay Goods.

BRADFORD CORPORATION. Tenders by Dec. 1.
SHEFFIELD GAS COMPANY. Tenders by Nov. 8.

Pipes, &c.

DEVONPORT GAS DEPARTMENT. Tenders by Nov. 12.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DAGOLIGHT LONDON." Telephone: 2836 HOLBORN.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

J. E. C. LORD, Ship Canal Tar Works,
Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
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AND
CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

TAR WANTED.
THE BURNDEN TAR COMPANY (BOLTON), LIMITED.
Hulton Chemical Works, BOLTON.

CALCIDUM, a Limpid, Colourless,
Neutral Liquid; does not affect Metals, freezes only at -67° F., and, therefore, when mixed with Water in Gas Meters, Engines, Generators, &c., prevents these Freezing in the most severe weather. It is also the best means of thawing everywhere, for Extinguishing Fires, and for working Mortar and Cement in Winter. Used regularly for Eight Years by one English Gas Company.
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Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
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SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.
86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

LUX'S GAS PURIFYING MASS.
See Advertisement on First White Page.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

READ HOLLIDAY AND SONS, LTD.
HUDDERSFIELD,
Are prepared to Supply
BENZOL, TOLUOLE, NAPHTHA, AND CREOSOTE
in large Quantities.
ENQUIRIES SOLICITED.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

SULPHURIC ACID — Specially prepared for Sulphate of AMMONIA and BENZOL Recovery Plants. JOHN NICHOLSON & SONS, LTD., Hunslet Chemical Works, LEEDS. Tele.: "NICHOLSON, LEEDS." Telephone: (Two lines), Nos. 2420 and 2421.

ROBERT DEMPSTER & SONS. Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
Communications should be addressed to Underwood House, PAISLEY.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 25, p. 238.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 23, College Hill, London, E.C., and 25, Bridge End, Leeds.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
Brotherton and Co., Ltd., Chemical Manufacturers, Works: Birmingham, Leeds, Sunderland, and Wakefield.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
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PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

TAR WANTED.
Telephone: Central Manchester, 7009.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

IT is Worth Your While to Buy Direct from the RELIANCE LUBRICATING OIL COMPANY GUARANTEED ANTI-CORROSIVE LUBRICANTS—viz., Motor Waggon Oil, 1s.; Motor Car Oil, 1s. 6d.; Engine, Cylinder, and Machinery Oils, 1s.; Axle Oil, 10½d.; Exhauster Oil, 10d.; Special Cylinder Oil, 1s. 4d.; 650 T Cylinder, 1s. 9d.; Special Engine Oil, 1s. 4d.; Gas Engine and Oil Engine Oil, 1s. 6d.; Refrigerator, 1s. 9d.; Renown Engine Oil, 11½d.; and Astral Disinfectant, 2s. 6d. per gallon. Barrels free, carriage paid. Solidified Oil, 25s. cwt.
The Reliance Lubricating Oil Company, 19 & 20, Water Lane, Tower St., London, E.C. Agents wanted.

COAL TAR wanted,
Brotherton and Co., Ltd., Tar Distillers.
Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

GAS Tar wanted—3000 Tons for Year.
Offers to be sent to Chemische Fabrik für Teerprodukte and Dachpappen, G.m.b.H, Campe by Stade, Germany.

CITY and Guilds Examinations in Gas Engineering. Correspondence Course just commencing. Lowest Fees, Highest Successes.
Write G. Stanley Cooper B.Sc., F.C.S., Heaton House, Cleckheaton, Yorks.

THOS. L. Cuttell, late General Manager (Ten Years) of the A.V.I.L. Company, Otley, is now OPEN FOR APPOINTMENT, Inside or Outside.
Address "Maythorn," Stanhope Road, Stockton-on-Tees.

ANALYST—A Smart Junior wanted.
Gas-Works Experience preferred.
Apply, by letter, stating Age, References, and Salary expected, to No. 5308, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

DRAUGHTSMAN wanted, at once, for Contractors' Office. Must be Capable of Taking out Quantities, Stresses and Strains, and must Possess an intimate Knowledge of Retort-House and Bench-Construction.
Apply, by letter, Stating Experience and Salary required, to No. 5307, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CHEMIST and Works Manager (Age 25 to 30) required for a Large Factory in London. Good General Chemical Training Necessary. Expert Inorganic Chemist, with Special Knowledge of Rare Earths and Salts preferred. Capable of Managing Works and Workpeople.
Replies, by letter, in strict Confidence, giving Full Particulars, to Edmund White, care of Hopkin and Williams, Limited, 16, Cross Street, Hatton Garden, E.C.

PONTYPRIDD AND RHONDDA JOINT WATER BOARD.

THE above-named Board invite Appli- CATIONS for the Appointment of ENGINEER and MANAGER to the Board, which has been formed for the purpose of acquiring the undertaking of the Pontypridd Water-Works Company.
Candidates must have a thorough practical knowledge of Water Engineering in relation both to the Storage and Distribution of Water, as well as the Detection and Prevention of Waste, and must also have had previous Experience in the Management of large Water Undertakings.
Salary, £350 per Annum.
The person appointed will be required to devote the whole of his time to the duties of the Office.
Applications, stating Age, Qualifications, and Experience, accompanied by Three recent Testimonials, should be sent to the undersigned addressed to him at his Offices in Mill Street, Pontypridd, marked "Engineer and Manager," not later than Monday, the 14th day of November, 1910.
Dated this 21st day of October, 1910.
W. P. Nicholas,
Clerk to the Board.

JET Photometer Wanted, with all Ac- cessories, Second-Hand.
Address No. 5309, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE—Two, Four, or Six 15 feet Square PURIFIERS, in Excellent Condition, with all Connections, &c. Cheap price for quick Sale, Delivered and Erected.
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FOR SALE—Complete Gas-Making PLANT, including New Gasholder and Steel Tank, 10,000 Cubic Feet capacity, ready for delivery, with Condensers, Scrubber, Purifiers, &c. Erected complete in England for £1200. Detailed Plan and Specification submitted.
TWO PURIFIERS, 12 ft. by 8 ft. by 5 ft. deep. Three Purifiers 5 ft. 6 in. square, complete with Four-Way Valves and Connections. Re-Erected cheap for immediate Sale.
GASHOLDERS, 16 ft., 24 ft., 26 ft., 30 ft., 42 ft., and 45 ft. diameter. Also 70,000 and 200,000 Cubic Feet capacity Gasholders. Cheap for immediate Sale. Re-Erected in either brick or new Steel Tanks. Full Particulars and Quotation submitted.
STORAGE TANK, 18 ft. long, 13 ft. 6 in. wide, 6 ft. deep, of ⅜-inch thick Boiler Plate. Also CAST-IRON TANKS. Inquiries Solicited.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

COUNTY BOROUGH OF DEVONPORT.
(Gas Department.)

TENDERS are invited for the Supply of CAST-IRON MAINS and SPECIALS required by the above Department.
Specification and Form of Tender, together with other Particulars, may be obtained from the undersigned.
Tenders, endorsed "No. 3," addressed to the Town Clerk, Devonport, to be delivered on or before Nov. 12, 1910.
W. P. Tervet,
Engineer and Manager.
Gas-Works, Devonport,
Oct. 26, 1910.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the Supply of SILICA and FIRE-CLAY GOODS required at their Works during the next Twelve Months.
Specifications and Forms of Tender may be obtained upon Application to the Company's Engineer, Mr. J. W. Morrison, Commercial Street, Sheffield.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered by post to Mr. Hanbury Thomas, Managing Director, not later than the first post on Tuesday, Nov. 8.
Wm. Hamby,
Secretary.
Commercial Street,
Sheffield, Oct. 18, 1910.

TO RETORT MANUFACTURERS.

THE Bradford Corporation are prepared to receive TENDERS for the Supply of GAS RETORTS, and of FIRE-BRICKS and FIRE-CLAY required in the fixing of such Retorts, during the Year 1911.
Form of Tender may be obtained on Application to Mr. Chas. Wood, Gas Engineer, Town Hall, Bradford.
Tenders, endorsed "Tender for Retorts," to be sent to me so as to arrive on or before Thursday, the 1st of December.
The Contract will be let subject to the Fair Contracts Clauses of the Corporation, which may be seen at the Town Clerk's Office, and which the accepted Contractor will be required to sign.
The lowest or any Tender will not necessarily be accepted.
Frederick Stevens,
Town Clerk.
Town Hall, Bradford,
Nov. 2, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.
NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES.
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 8, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of Executors and Other Owners.
THE GAS-METER COMPANY,
73 £10 FULLY-PAID ORDINARY SHARES.
CITY OF ELY GAS COMPANY,
£300 ORIGINAL CAPITAL STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 8, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
PINNER GAS COMPANY, LIMITED.
NEW ISSUE OF 800 £5 "B" SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 22, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
TAUNTON GASLIGHT AND COKE COMPANY.
ISSUE OF £3000 NEW STOCK (PAYING £7 17s. 6d. PER CENT.).

WILLIAM J. VILLAR and Co. will SELL THE ABOVE BY AUCTION, at the Castle Hotel, Taunton, on Monday, Nov. 7, at 3.30, in Lots.
Particulars of the Auctioneers, 10, Hammet Street, Taunton.

THE Proprietor of the Patent No. 24,463, of 1907, for "IMPROVEMENTS IN ACETYLENE GAS GENERATORS," is desirous of entering into Arrangements, by way of LICENSE and otherwise, on Reasonable Terms, for the purpose of EXPLOITING the same and ensuring its Full Development and Practical Working in this Country.
All Communications should be addressed in the first instance to Haseltine, Lake, and Co., Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, London, W.C.

ORIENTAL GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that an ORDINARY GENERAL MEETING of this Company will be held at the Company's Office, Finsbury House, Blomfield Street, London, E.C., on Wednesday, the 16th day of November, 1910, at Twelve o'clock noon precisely, for the following purposes: To receive the Directors' Report and the Accounts of the Company for the Year ended the 30th of June, 1910; to declare a Dividend; and to elect Directors and Auditors in the place of those retiring.

The TRANSFER BOOKS WILL BE CLOSED from the 2nd to the 24th of November, both days inclusive.

By order of the Board,
H. J. LUFF,
Secretary.

Finsbury House, Blomfield Street,
London, E.C., Oct. 26, 1910.

In Large Crown 8vo. Fully Illustrated. In Two Volumes.

VOLUME I. FOURTH EDITION. Price 7s. 6d. net.
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THE CHEMISTRY OF
GAS MANUFACTURE:

A Hand-Book on the Production, Purification, and Testing of Illuminating Gas, and the Assay of the Bye-Products of Gas Manufacture.

By W. J. ATKINSON BUTTERFIELD, M.A., F.I.C., F.C.S.

"The Best Work of its kind which we have ever had the pleasure of reviewing."—*Journal of Gas Lighting.*

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THE GAS TURBINE:

Progress in the Design and Construction of Turbines Operated by Gases and Combustion.

By HENRY HARRISON SUPLEE, B.Sc.

"Will be of considerable assistance to Gas Power Engineers."—*Gas World.*

LONDON: CHARLES GRIFFIN & CO., LIMITED, EXETER STREET, STRAND.

SCRAP BRASS, LEAD, &c.

Highest Cash Prices given for above.

ADDRESS:
ARTHUR P. COLLINS,
CENTRAL HOUSE, BIRMINGHAM.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER,
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
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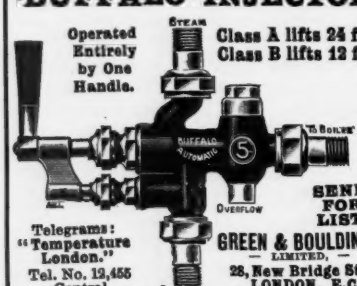

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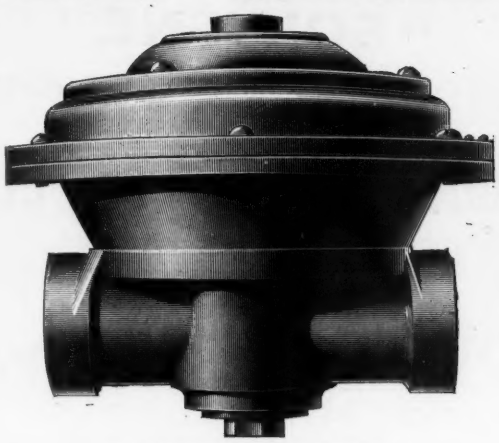

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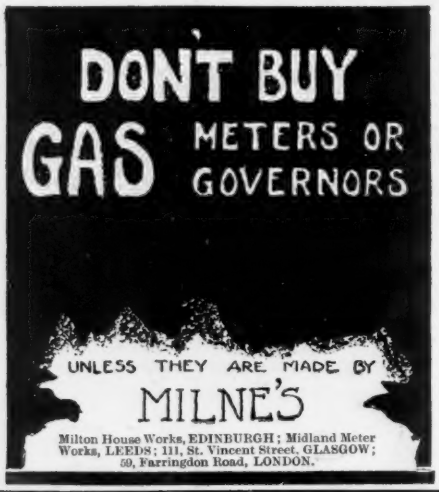
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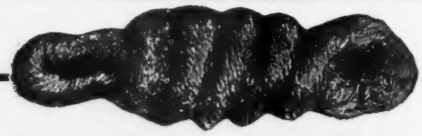

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Hamburg ,, (2nd Order)	14	310 ,,	42
Berlin, Tegel	27	526 ,,	81
Rome	20	350 Tons	60
Paris, Genevilliers	20	272 ,,	60
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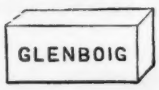

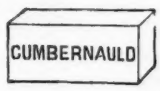

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Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, Leadenhall Street,
London, E.C., September 21st, 1909.

Dear Sirs,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

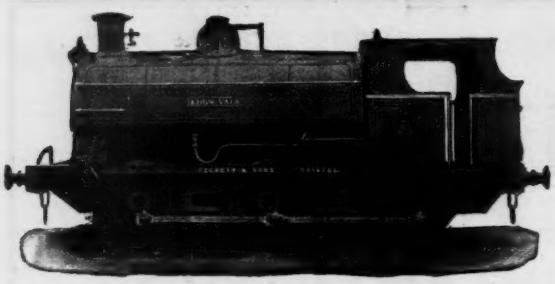
PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 1000° C.	3·70%
" " " 1050° C.	4·76%
" " Total	8·46%
Volume shrinkage at 1000° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. 3362° F. (SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.



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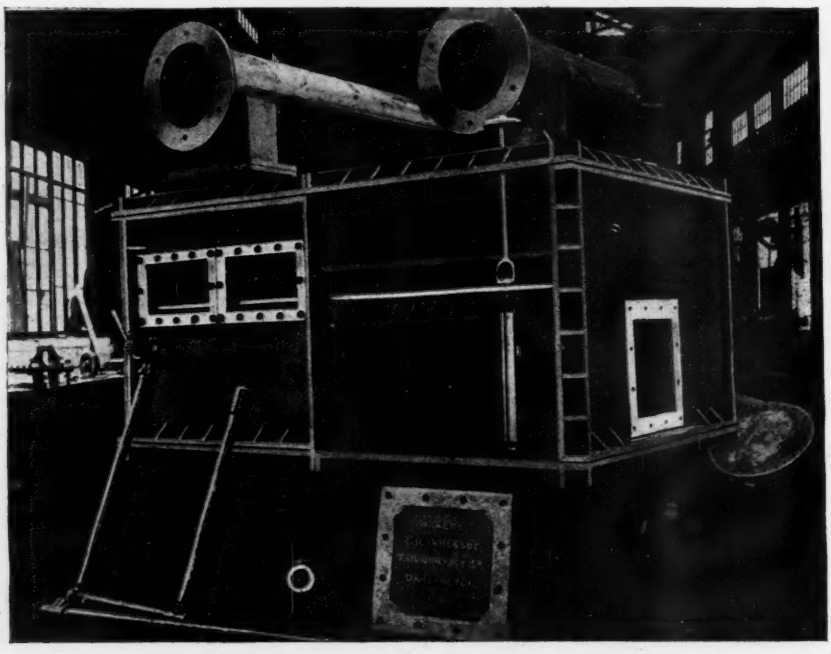

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Inverted Arc Lamp, Fig. 623.

Storm Proof—

For Exterior Lighting.

Welsbach-Kern

(Patent) Inverted System

BRITISH MADE. **BRITISH MADE.**

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
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3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

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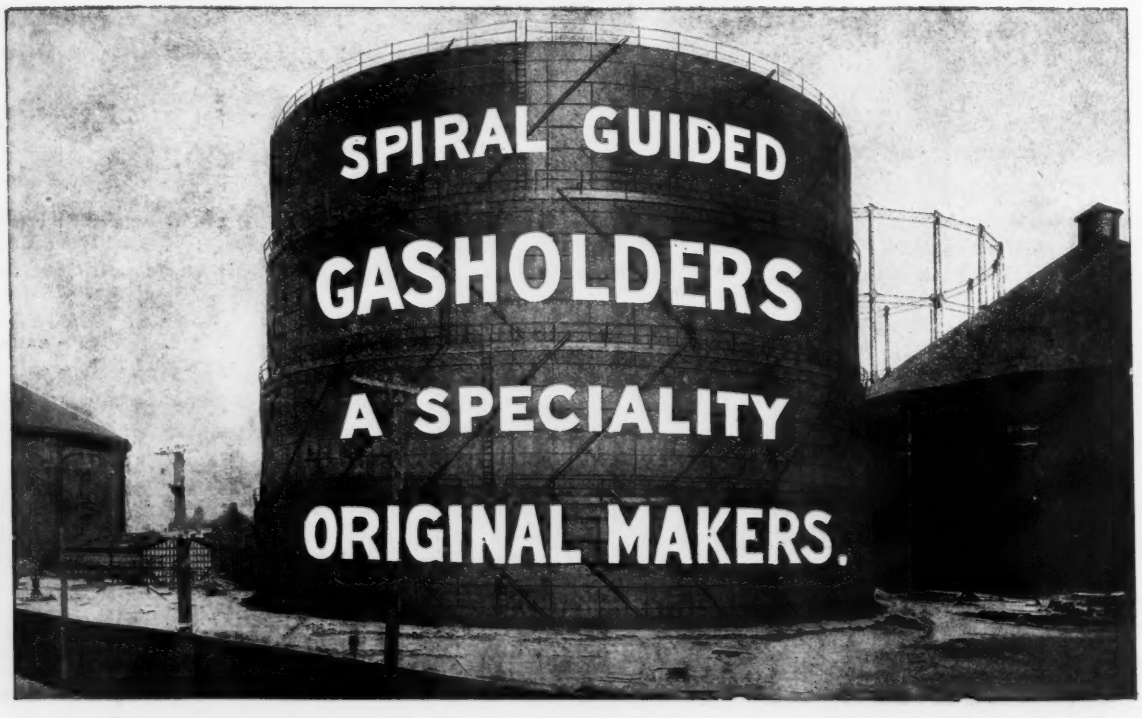

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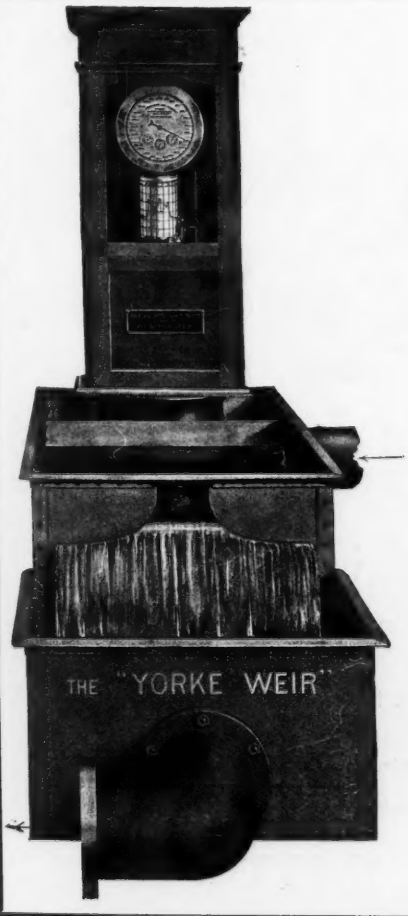

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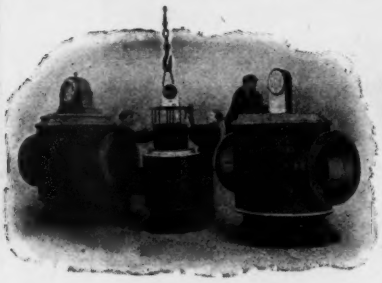

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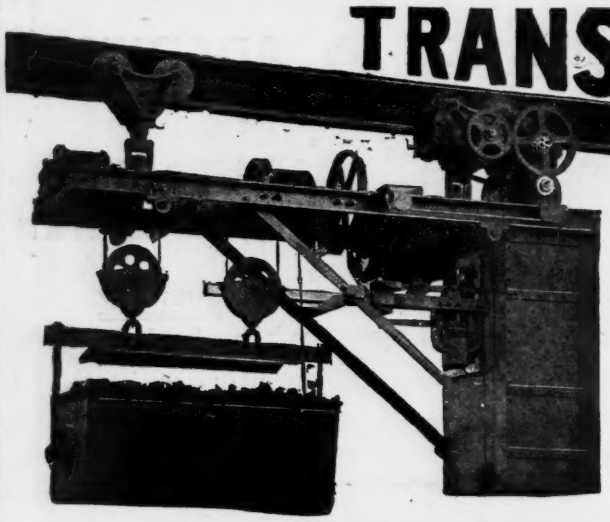

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Fig. 705. "SINGLE RAM" STEAM-PUMP.

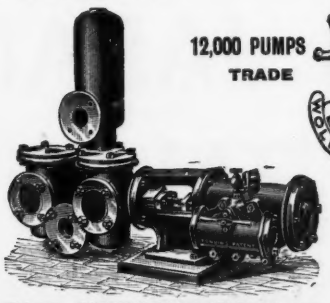

Fig. 808. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

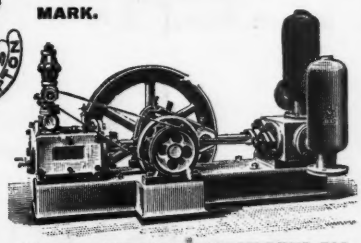

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

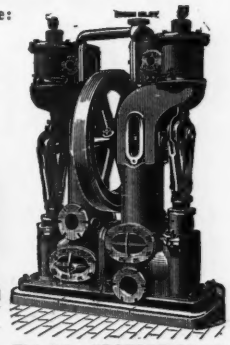

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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